TURNING IP INFORMATION INTO A COMPETITIVE ADVANTAGE

Developing a software tool for competitive and technology intelligence at an SME

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Abstract

According to EPO, patent documents count for approximately 80 % of scientific and technical information world-wide. Only 5 – 10 % of the knowledge published in patent documents is contained in other sources. These facts make patent documents a crucial source of information for companies and organizations involved in research and development of new technologies.

The objective of this work was to help one Finnish SME in utilizing patent information and turning it into superior knowledge about its competition and technology field. Action research was chosen as a methodology, in order to allow for more freedom for the author to solve the problem. First, the actual need of the company was revealed. Then the market of existing software solutions was studied and interviews with IPR and IT professionals carried out. These steps (actions) revealed an existence of a significant gap between professional and non-professional patent searching software tools and led to a decision to develop a new tool, which would be exclusively tailored to needs of SMEs.

As a result, a new software tool for working with patent documents was developed and presented to the company. Due to the fact that the needs of the SME were generic and were no different to the needs of many other SME, the developed tool has potential to be widely used in Finland and other EU countries.

Keywords
Action research, patent documents, patent search, technology intelligence, competitive intelligence, IPR, patents, software, software development, patent monitoring , IP, Intellectual Property Rights

Miscellaneous

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TERMINOLOGY

Key abbreviations

ECLA – European Classification

EPO - European Patent Office

EU – European Union

IP – Intellectual Property

IPC – International Patent Classification

IPR- Intellectual Property Rights

JPO – Japanese Patent Office

SME – Small and medium size enterprises

USPTO – United States Patent and Trademark Office

WIPO – World Intellectual Property Organization

Key definitions

Mask – the mask (or mask of the search, search mask) is a term used inside the developed tool to represent a set of search keywords for a patent search (e.g. “Title”, “Abstract”, “Inventor” etc.). The tool retrieves patent documents from the source database according the keywords, specified in a mask. A mask may also include user commentary for each retrieved patent document or for the entire mask.

Open source software –allows use and redistribution of the open-source software without compensation or even credit (DiBona, Ockman & Stone 1999, 3).

Prior art - Prior art is **any** evidence that your invention is already known. Prior art does not need to exist physically or be commercially available. It is enough that someone, somewhere, sometime previously has described or shown or made something that contains a use of technology that is very similar to your invention. (EPO 2011d)

SaaS or Software as a Service - is a web-based software deployment model that makes the software available entirely through a web browser. As a user of SaaS software, you don’t care where the software is hosted, what kind of operating system it uses, or whether it is written in PHP, Java, or .NET. And, above all else, you don’t have to install a single piece of software anywhere. (Reese 2009, 2)

1 INTRODUCTION: Turning patent information into competitive advantage

This research was conducted for a Finnish technology intensive SME - AFM-Forest Ltd. The research was intended to be practical and it involved actual development of new processes within the firm. The research question of this study is:

What can be an affordable and easy-to-use tool for turning patent information into competitive advantage of an SME?

According to EPO, patent documents count for approximately **80 %** of scientific and technical information world-wide (Ruotsalainen 2008, 3). Only **5 – 10 %** of the knowledge published in patent documents is contained in other sources (Saukkonen, J. 2010, 3). In the EPO's online patent database - Esp@cenet - alone there are around 60 million searchable patents from more than 80 countries covering the period stretching from the 19th century to today (EPO 2011a). These facts make patent documents a crucial source of information for companies and organizations involved in research and development of new technologies.

In practice, information contained in patent documents can be used by technology intensive companies to predict, which technologies and products their competitors are going to launch in particular geographical markets in near future. Patent documents contain detailed descriptions of inventions they protect and are written the way that enables others to reproduce and fully understand technologies behind the protected inventions. This is why information contained in patent documents, also can serve as a source of fresh ideas and knowledge for further development and enhancement. Yet more important reason to use patent information is to avoid unnecessary legal and R&D costs. In case a company has started an R&D project without a proper check of the prior art (e.g. patent documents), it risks to waste all the money invested in R&D just to learn that similar technology already exists and has been patented. Unfortunately, this seems to be a major problem in Finland. According to VTT (2009, 3) **33%** of Finnish patent applications between years 2000-2005 were not granted to patents because of obstacles for novelty, i.e. the patent application was filed for an already published invention. On yearly basis this translates into approximately 800 rejected applications or 700 000 EUR wasted on

the patent application process only. It is hard to estimate how much money and effort is wasted every year in Finland to carry out this duplicating R&D, but it is clear that the patent application cost is just a tiny fraction of the big picture, which also includes court settlements and other legal costs incurred by patent infringements.

The issue of providing solutions for turning the huge mass of IPR information into a competitive advantage has been addressed by many software development companies. There are numerous different databases and software applications in the market, providing ways to work with patents, trademarks, utility models, patent applications and other forms of IPR data. Some of them are more tailored to collecting and organizing data; some of them are more focused on different types of statistical analysis of data (e.g. technology mapping). For the purpose of this research, some of these tools were briefly reviewed.

Despite the fact that numerous software applications exist in the field of collecting, storing and analyzing IPR information, most of them are targeted to professional users. According to the company, virtually all existing software applications and databases can be characterized as too expensive and/or too complicated for the needs of SMEs in Finland.

This observation is also supported by the staff of the local office of ELY-Keskus in Jyvaskyla. IPR professionals from ELY-Keskus provide Finnish companies, entrepreneurs and private inventors with general IPR consultancy on daily basis and are assumed to know the current situation well.

Therefore, the purpose of this research was not only to answer the research question but also to ensure that the company gets the desired tool. As it turned out during the course of the research, available in the market tools could not fully satisfy the company needs and the original research question transformed into the final, which is stated below:

Develop and realize a technical solution of an affordable and easy-to-use tool for turning patent information into competitive advantage of an SME.

The new tool was supposed to suit the needs of AFM-forest, which strove to turn patent information into its competitive advantage. In spite of the research taking

place in Finland, the new tool was also expected to suit the needs of SMEs in other countries around the whole EU. SMEs from USA were not taken into consideration due to the discrepancies of European and USA IPR systems.

It was the joy of creating something novel, as well as potential opportunity to scale this tool into a multinational business, which kept the author motivated to carry out this research and utilize the results in practice. Indeed, the results were surprising and revealed an opportunity to create a marketable software product with potential to satisfy the needs of SMEs all across the EU. Some technical solutions, which were based on the findings of this research, were later filed in corresponding patent offices to initiate the process of obtaining a patent for them.

This way not only did this work answer the research question and solve a company problem, but it also started its own innovation process, including the protection of related IPR and the development of a marketable software product for SMEs around the EU.

I ought to acknowledge the great contribution to this research made by Mr. Jouni Hynynen from ELY-Keskus, who shared his invaluable experience and knowledge with the author and helped him to get started.

2 METHODOLOGY AND REPORTING: Action research

As long as answering this research question involved developing an actual tool, action research was chosen as the method to carry out this research.

Action research is known by many other names, including participatory research, collaborative inquiry, emancipatory research, action learning, and contextual action research, but all are variations on a theme. Put simply, action research is “learning by doing” - a group of people identify a problem, do something to resolve it, see how successful their efforts were, and if not satisfied, try again. (O'Brien, R. 2001)

Action research is widely used in education (Waters-Adams, S. 2006). The idea behind action research is to learn from the actions taken during the research process.

According to Riel (2010) action research is an iterative, cyclical process of reflecting on practice, taking an action, reflecting, and taking further action. Therefore, the research takes shape as it is being performed. Better understanding from each cycle points the way to improved actions.

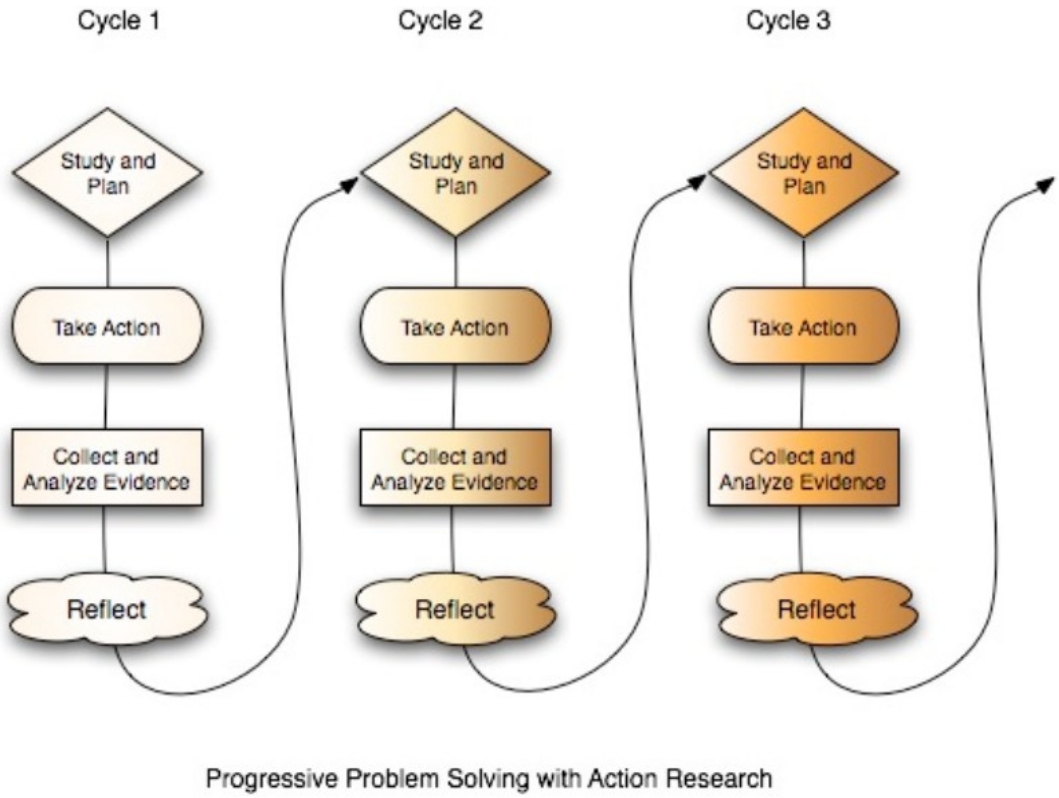

FIGURE 1. Progressive problem solving with action research by Riel (2010).

In this action research the abovementioned cyclical model was followed. The model was customized and adopted for the purpose of the research. In particular, reflection parts of each cycle were affected by changes. Each cycle reflection was not aimed at analyzing the process of each action (as the original model suggested) but at analyzing the results of each action and their implication to further development of the work. This way the model became more straightforward and goal oriented. Not only was the research question expected to be answered, but also an actual software tool was expected to be developed.

In order to approach the posed research question, relevant literature and articles were used as secondary data and qualitative methods (interviews, discussions) served as sources of primary data. Interviews were carried out with professionals from three different fields: Intellectual Property Rights, Information Technology and Corporate Management. Those interviews were analyzed within the abovementioned model as actions in several cycles and they guided the author

through to the major action (and purpose) of this research, which was developing a software tool.

Why Action Research?

Action research was chosen as a method due to several reasons. First of all, not only did the research question involve a study and analysis of a particular issue, but it also involved actual development of a software solution for a particular problem. Therefore, the research was intended to be practical and it called for observation of professional practice of the company and other parties involved. It was assumed that the most suitable method for dealing with such a research question could be a sequence of iterative actions or inquiries, when results of one action or inquiry would lead to another action or inquiry. First it was necessary to determine the real need of the company, then to collect information about how similar needs had been addressed by software solution-providers and then finally conclude what should be developed and how.

The research was carried out in 4 cycles, each having its own research sub-questions. All sub-questions in this research were interrelated; one sub-question led to another and so on and so forth in a sequence until the main research question was fully addressed.

Reporting

As for reporting, the narrative structure was chosen, which was expected to suit the qualitative nature of the research. Narrative reporting structure helped the author to better express the whole process of development “in motion”. The plan for the research was to closely cooperate with each interviewed professional and study his/her individual experience to come up with a solution. This seemed to be an obvious choice for the author. As Schostak (2011) explains, “a statistical or 'positivistic' approach chops experience up into classes and variables”. But in order to answer the posed research question, the author had to delve deep into practices of several professionals and examine their experience. As Schostak (2011) states “judgment”, “intuition”, “empathy”, “insight”, “wisdom” are usually accepted by professionals as qualities associated with them. He adds “But none of these are

readily open to objective measurements. Nevertheless, they are included in what we mean when we say of someone that he or she is a “good professional”” (op. cit).

In other words, it would have been impossible for the author to express practical experience of interviewed professionals and gained insights, if an objective measurement had been chosen.

The thesis is split into two parts: Theory and Research. The theoretical part serves as a background for the Research part.

In the following part theoretical concepts are introduced. IPR protection system is reviewed in the light of its value for competitive and technology intelligence.

3 CONTEXT: IPR system as a source for competitive intelligence

3.1 Competitive intelligence

> *"Compet**ito**r intelligence" often involves observing the other players in our market, comparing their operation with ours and trying to divine their next moves. This approach relies heavily on benchmarking where we make comparisons, using various indicators, between our rivals and us.* (Murphy 2005, 4)

In his book Murphy describes a difference between compet**itor** intelligence and compet**itive** intelligence. He argues that what people usually refer to as compet**itor** intelligence is not enough for a business to develop and prosper. In his book he introduces compet**itive** intelligence, which is a wider concept that should enhance competitor intelligence. His idea is that for a company it is not enough just to keep a close eye on its competition, but also be aware of "all other factors which can endanger or enhance company's revenue or profits". He names numerous different factors, both internal and external, but for purpose of this research I want to pay my attention to one – technology.

Technology

"They {railroad companies} let others take customers away from them because they assumed themselves to be in the railroad business rather than in the transportation business." (Levitt, 1975)

Technologies come and they go. Marketing myopia is a trap where not single companies but whole industries fall into. "Marketing myopia" was first introduced by Theodore Levitt in 1960 in his article in Harvard Business Review, when he described why many industries experience rapid and severe declines after a magnificent performance for several years. One of his examples in this article was about the railroad transportation industry. After years of fine growth the railroad industry in the USA suddenly started to slow down. The companies within the industry were continuously striving to build better and better trains to please their customers. At the same time it was obvious that demand for transportation was not decreasing. But still the railroad industry suffered from a downturn. As Levitt described, it was a

top management's mistake. Instead of thinking about the customer need for transportation, the railroad companies were trying to deliver better trains, but not transportation. That was a time when aviation and road transportation took over.

As Kotler, Wong, Saunders and Armstrong described (2004) "marketing myopia" is a consequence of too product focused marketing approach. It happens when a company is so focused on its product and features that it forgets the fundamental role of customer needs. (p. 15)

Kotler et al. emphasize that customers buy holes in walls, not drill bits. Or, more likely, the real need is to fix things together. (p.9)

Therefore, from the perspective of competitive intelligence it is crucial for companies to look "out of the box" and be aware of their customers' needs and new technologies, which emerge to suit these needs. For example, it is vital for a company, which manufactures drills and related products, to continuously monitor other emerging technologies for "fixing things together". It might turn out that its most dangerous competitor will come from other industry than drill manufacturing. It might seem obvious from the beginning and you might wonder why on earth one company would forget about its customers' needs. It must take courage to realize that the whole industry is going down because of change in the technology or other external factor. For decision makers in a company it is always hard to accept that the industry they are in is getting obsolete. It may even seem a waste of time for a successful company to look "out of the box" and continuously search for new opportunities.

Some people say that success blinds people. Dan Scoggin, the man who founded TGI Friday's, chain of American restaurants, expressed problems of being successful very well. According to Scoggin, the problem of forgetting about your customers' needs is caused by so-called Success Syndrome. It is a malady that sooner or later attacks almost every business. He explains that it happened to his chain of restaurants, when they reached their first success and started to grow. He claims when a company experience success it naturally start to feel more comfortable and confident. Loads of new customers queue outside, waiting for their chance to get outstanding service and meal. But this is the time when a company is a little bit short with the last customer. But company does not care anymore so much about a single customer,

because it knows that there are plenty more coming tomorrow. And this is when Success Syndrome takes off. As a consequence, quality of service plummets, revenues fall and number of customers decreases. (LeBoeuf 2000, pp.7-9)

Marketing myopia and Success Syndrome are the maladies, which can strike any industry. But if one tries to think about an industry, where those problems are of greater impact, he/she cannot miss technology intensive industries. These are companies with buzz name "Hi-tech companies". In many cases, top management of these companies has an engineering background and mentality. Especially, this concerns hi-tech SMEs. The engineers are the locomotives of economic growth, but for the most part they are the people, who think "product" not "customer need". The engineer's mentality in its very core has an embryo of mixed Marketing Myopia and Success Syndrome. An engineer in essence is product centric. Seldom can you find stars like William Gates, who manage to combine both product centricity and customer orientation.

To sum up, all technology intensive companies have to be careful with sticking to any single technology field. There can be different reasons why companies dig themselves too deep into any single technology. It can be cause by Success Syndrome or by the fact that top-management is too product centric and biased by the engineering mentality. This makes broad technology surveillance crucial for hi-tech SMEs.

3.1.1 More reasons to look "out of the box"

Even Warren Buffet, one of the greatest investors known, also made similar mistake in his investment life. This is not related to the switch of technologies anymore, but still the concept is the same. Buffett's greatest managers had been struggling for years with once profitable textile business of Berkshire Hathaway, but it never showed satisfactory results. It turned out that the US textile industry just could not be competitive enough to fight against competition from abroad for many reasons. One of those reasons was cheaper labour force. Buffett's final word on that issue was:

> *My conclusion from my own experience and from much observation of other businesses is that a good managerial record (measured by economic returns)*

> *is far more a function of what business boat you get into than it is of how effectively you row (though intelligence and effort help considerably, of course, in any business, good or bad). Should you find yourself in a chronically-leaking boat, energy devoted to changing vessels is likely to be more productive that energy devoted to patching leaks.* (Buffett 2002, 51)

Technologies compete against each other, the same way as companies and industries compete in the globalized economy. It is important to be aware of potential threats coming from the competing technology fields. For example, consider personal telecommunication market of 1990's and the switch from pagers (beepers) to mobile phones. Even if beepers are still used by limited number of professionals, in particular, when it is impossible to use mobile phone technology, it is clear that the majority of pager users switched to mobile phones. It was clearly not enough for companies within the pager industry to follow the latest developments in technologies related to pagers. These companies, who did think about the need of their customers and stayed open to new technologies, were the ones who could survive. These who limited themselves to the old technology, were to see their revenues and profits plummet.

3.1.2 Bottom line on competitive intelligence

On the basis of what was said above, a conclusion can be drawn that what Murphy (2005, 4) refers to in his book as competitor intelligence is truly not enough for sustainable development of a company. There is a certain need for a company to monitor many external and internal factors, which affect the future of the company and the whole industry itself. Of course, keeping an eye on competition and benchmarking is still a vital tool, but it has to be enhanced with other tools of intelligence. And only the aggregate of all those tools can be comprehensive and efficient. This is what Murphy (2005, 4) refers to as competitive intelligence.

Technology intelligence, or simply keeping up to date with the latest changes in relevant technologies, is one of the most significant parts of competitive intelligence. As already mentioned, competitive intelligence and especially technology intelligence are crucial for hi-tech SMEs to survive. In order to develop and prosper hi-tech companies always need to keep themselves one step ahead of the competition and surf the edge of the wave of technological progress. Thor Heyerdahl

was so right, when he said: “Progress is man’s ability to complicate simplicity”. When a company is involved in a hyper technology-intensive field, it can simply dig itself too deep into its products and completely forget about customer needs.

3.2 IP Protection system

Intellectual property is a product of the mind, and as such, it is distinct from the usual notions of "property." Land, buildings, vehicles, clothing, even your hat, are all tangible property. You can own them, lend them, and pass your ownership temporarily or forever to another person. You can judge their commercial value by looking at them, measuring them. You can do price comparisons with other similar tangible properties. (Shippey 2009, 1)

An intellectual creation, until it is presented in a tangible form, cannot be sensed by someone other than the creator, and it has value only to the creator. It is intangible property, present only in the creator's mind. (Op. cit. p. 1)

Intellectual property can be in many different forms, but most commonly known are patents, copyrights and trademarks. There are many other forms of IP like: industrial designs, utility models, trade secrets and others. For the purpose of this research the author will be focusing mainly on patents.

TABLE 1. Traditional forms of IP: A quick comparison by Shippey (2009, p.3).

<table>
<tr>
<td>A PATENT PROTECTS:

1. Inventions (anything, process or idea), that are
2. not already known generally and currently (novel), that are
3. reducible to tangible form or used in tangible form without too much skill or ingenuity, that are
4. valuable or useful to society, and that are
5. conceived or discovered by the inventor;
6. for a finite term.</td>
<td>A COPYRIGHT PROTECTS:

1. Original (not copied) expressions of ideas, that are
2. creatively produced, and that are
3. fixed in tangible medium (such as paper, tape, disk, canvas, wood,
4. metal, clay};
5. for a finite term [typically life of creator plus 50 to 70 years).</td>
</tr>
<tr>
<td colspan="2">EXTREMELY IMPORTANT CONCEPT: Expression versus Idea. A copyright will not protect the idea, only the expression.</td>
</tr>
<tr>
<td colspan="2">A TRADEMARK PROTECTS:

1. A word, phrase, sign, symbol, shape, or label, that is
2. a distinctive identifier of the goods or services of the creator when placed in commerce, that is
3. used to distinguish goods or services from those of any other person or business;
4. for an indefinite term (provided renewal is made before the term expires).

EXTREMELY IMPORTANT CONCEPT: Classification of Goods and Services. Unlike a copyright or patent, a trademark right is granted only with respect to the specific goods or services claimed by the trademark owner. An exception may be made for famous trademarks, but only if the exception is recognized in the particular country at issue. Thus, the trademark Adidas® as used for shoes would not be infringed against by a company that uses the same trademark in connection with tobacco, unless the jurisdiction will recognize the trademark as famous and will accord it protection regardless of the goods or services.</td>
</tr>
</table>

3.2.1 Why the system exists? Altruists vs. Businessmen

The idea of Intellectual Property protection is very simple, but on the other hand this simple thing is greatly contributing to the growth of world economy and standard of living. Without the protection of IP rights our world would look like bunch of multiple camps fighting against each other by reproducing each other's inventions and calling for justice.

It is simple because it is logical and just that a person, who made a breakthrough invention, not only gets honorable and remarkable place in history of the field, but can also make a living out of this. Nevertheless, there are some truly scientific minds in this world, for example Louis Pasteur (1822-1895), who was a very famous French chemist. Probably, because of his rather scientific than business set of mind, his # 1 goal was definitely not to benefit economically from his inventions. And it was not him who made a fortune out of his ideas. Even a single one out of many ideas of him could have made him enormous fortune. A single invention of a method to preserve milk and wine from going down (which was called pasteurization in honor of him) could alone bring him a lot of money, if made into business. It could have been a true breakthrough in trade and logistics of the 19-th century, if he had been able to commercialize this idea. But the author believes he was a truly scientific mind and he did not even care about making money out of his findings. He just wanted to cure and help other people. His motivation to invent was not financial, but some other:

> *Gentlemen, you bring me the greatest happiness that can be experienced by a man whose invincible belief is that science and peace will triumph over ignorance and war.… Have faith that in the long run … the future will belong not to the conquerors but to the saviors of mankind.* (Pasteur 1892)

Read on his behalf by his son on his 70-th birthday in Sorbonne. His son read it aloud due to he was too weak to speak to the delegates who had gathered from all over the world.

For the good or bad, that kind of inventors-altruists are not that numerous. It is obvious that the whole mankind and world economy cannot be growing and flourishing only based on a bunch of altruists and generous people like Louis Pasteur. Also someone has to help them to actually make real business models out their inventions. Therefore, there is a need for making it possible for not-so-altruist

inventors and their business savvy partners/investors to make a living (and hopefully a fortune) out of their inventions. And it is very natural. Probably no one can tell an exact figure, but it is clear that an overwhelming part of the world population has nothing to do with altruism, and their motivation to invent and innovate is more on the financial side.

As for the economic effects of inventions and their importance in economic growth and continuous rise of standard of living, there is clearly a need that national governments establish and promote a system to protect inventors. This is why different IP protection systems exist worldwide and there are plenty of international IP protection agreements and cooperation (for example, international conventions for copyrights). It differs from country to country, or rather from continent to continent, but the general idea is to identify genuine author/inventor and provide him/her with exclusive rights for his/her IP.

3.2.2 First-to-file vs. first-to-invent

Intellectual property is intangible and until expressed in some physical form, is impossible to sense by anyone except the author. Also no one can ever discover whether a person, who claims himself an inventor of an idea, actually tells the truth. Maybe he himself does not know the truth. In fact this makes intellectual property very hard to define, and the system works according to a simple rule: no matter who was first to have the idea, the inventor will be the one, who first materializes it and presents to public. IPR Systems in different regions of the world do differ, but the core idea of being the first to express the idea in a physical form stays the same everywhere. The difference is in that physical form. EPO (2011c) summarizes the difference between IPR systems in the world:

> *Virtually every patent office in the world (including the EPO and the JPO) is based on a first-to-file system. Under such a system, entitlement in the case of competing applications by independent inventors is established on the basis of the filing or priority date of the application, regardless of the date of actual invention.*
>
> *The USPTO, however, is the only office to be based on a first-to-invent system, meaning that a patent is granted to the person who first conceived and practiced the invention, rather than to the person who first filed the invention*

with authorities.

There are pros and cons to both systems: The first-to-file system is based on an objective criterion which can be easily determined on the face of the documents without recourse to extraneous evidence and without costs. This leads to procedural certainty as the filing date of an application can very rarely be challenged. The process is in sharp contrast to the expensive and time-consuming examinations that occur at the USPTO when challenges to a patent arise. Critics say, however, that the first-to-file system tends to benefit larger companies who can afford to file patent applications rapidly, as opposed to individual inventors with few resources.

(directly quoted from the EPO web-page)

3.2.3 Patents and patent databases

I not only use all the brains that I have, but all that I can borrow.

Woodrow Wilson (1856-1924)

Definition of a patent:

> *A "patent" may be defined as (1) the exclusive right granted by statute (2) to a party (the inventor) who conceives or discovers (3) a nonobvious and novel invention (4) to use and develop the invention, and (5) to prevent others from manufacturing, selling, or using the invention. The patent right is granted for a limited time, which varies depending on such factors as type of invention and jurisdiction of registration. Patent terms are typically from 14 to 20 years and usually the term cannot be extended.* (Shippey 2009, 4)

In order to get a patent protection an inventor has to disclose the details of the invention. These are for example original drawings, laboratory diaries, models, texts descriptions. All this information becomes public. This is sometimes called the "patent bargain".

As a consequence of this disclosure, which is made in several steps starting with filing a patent application, a lot of useful information is being revealed to public. In Europe, it usually it takes 18 months from the moment an application is filed until it gets published.

For a European inventor there are three options to file his patent and it depends on his needs and countries where he wants to operate.

- National level (for example Finnish Patent Office; http://www.prh.fi/)
- European level (covering more than 35 countries; http://www.epo.org)
- International level (under Patent Cooperation Treaty (PCT); 184 member states)

The EPO is an intergovernmental organization that was set up on 7 October 1977 on the basis of the European Patent Convention (EPC) signed in Munich in 1973. It has two bodies, the European Patent Office and the Administrative Council, which supervises the Office's activities. The Organisation currently has 36 member states.

Patent databases

Most of the patents (with some exceptions for older ones) are available in digital format online. Many national and international patent offices provide online databases with different searching features.

Porter et al. (2005) provide many useful links to different online resources, which can be very useful for tech mining. They also pay attention to patent databases as a main resource for tech mining.

> *Patent databases provide the other main tech mining resource. Patents are the key public disclosures of invention. The US Patent and Trademark Office (USPTO) is the largest database of patents in the world (http://www.uspto.gov/). Because of the extent of American invention and the appeal of the U.S. market, if you were to pick one resource for measuring patent activity, this would be a good one.*
>
> *Virtually all industrialized nations have their own patent systems. The Japanese Patent Office (JPO) is the second most prominent, with English language patent availability on its website (http://www.jpo.go.jp/). The European Patent Office (EPO) helpfully consolidates much European patenting (http://www.european-patent-office.org/), but national patenting remains legally important. The World Intellectual Property Organization (WIPO) (http://www.wipo.org/> provides resources such as the Intellectual Property-Digital Library with international registrations and patent cooperation treaty filings (these provide international protection for a year, after filing in one country to decide in which other countries to file).* (pp. 74-75)

With help of these databases nowadays anyone, who has connection to Internet, can access dozens of millions of patents and browse all original documents for them.

3.2.4 Sample patent search

Esp@cenet is an online searchable patent information database, provided by EPO. It covers more than 60 million publications from more than 80 countries worldwide. It a very simple interface and can serve as an example of how an online patent search can look like in its most simplified version.

For clarity the process is broken into 3 steps:

Step 1: Search

FIGURE 2. User interface of the advanced search in Esp@cenet. (Esp@cenet 2011a)

In this simple interface a researcher can input different keyword in different fields. One field can be:

- Title of a patent
- Abstract
- Publication, Application or priority number
- Applicant's name
- Inventor's name
- Classification code.

According to the keywords in the fields the search engine of the database will retrieve the patent documents, which satisfy particular searching criteria. As a result of a search the researcher will get a list of different patent documents:

Step 2: Result list

FIGURE 3. User interface of the result preview list in Esp@cenet. (Esp@cenet 2011b)

Here the researcher can see a list of patent documents, which satisfy his/her searching criteria. He/she can sort the results in different ways. From this list the researcher can read details of each particular document by clicking on its title.

Step 3: Patent details

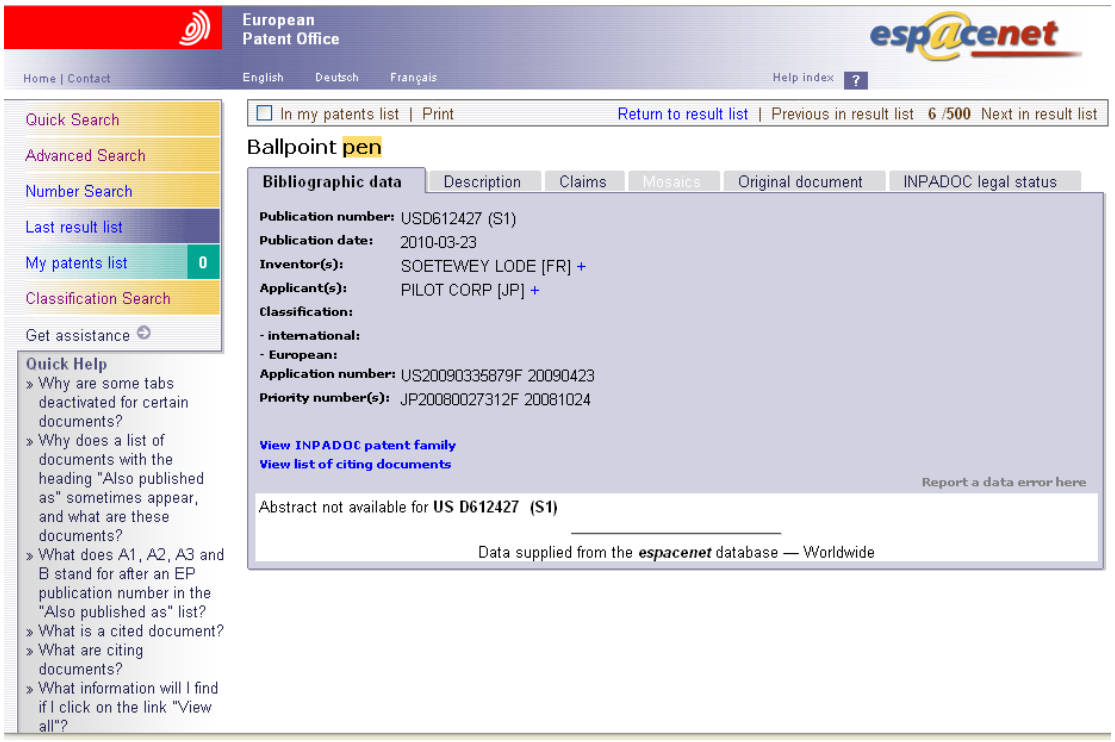

FIGURE 4. User interface of the publication details preview in Esp@cenet. (Esp@cenet 2011c)

Here the researcher can view all details available for the selected patent document. This information includes description of the invention, scan of the original document, drawings, claims, legal status etc.

As it was shown above it is very easy to find a patent document and get all major information about it from the database. However, from the perspective of competitive intelligence, these searching features are not sufficient. In essence, Esp@cenet and the likes, provide the user only with a snapshot of the current state of available patent documents. But new patent documents appear in the

Esp@cenet's source database almost daily and it is hard to efficiently monitor the situation with given searching features. Another problem arises when there is a need to save the search results.

3.3 Why IPR protection system?

Your ability to learn faster than your competition is your only sustainable competitive advantage.

Arie de Gues

It should be acknowledged that IPR is not the only source of information, which can be used for technology intelligence. Information about the hottest changes in technologies can be found in many different types of media. Usually there are multiple industry specific journals, scientific networks and organizations, which target to cover all major events related to a specific industry or technology.

However, these sources only cover specific technologies or industries and do not present information in a more generic and broader way. In this sense, IPR is a goldmine of technology related information. Since the patent system was established, more than 60 million patent documents have been published (Ruotsalainen 2008, 3). These publications disclose millions of inventions in an incredible number of technology fields. According to EPO, patent documents count for approximately 80 % of world-wide published knowledge (Op. cit. p. 3). Only 5 – 10 % of the knowledge published in patent documents is contained in other sources (Saukkonen, J. 2010, 3). Therefore, these companies, who miss patent information, leave 90-95% of important information to their wiser competitors.

According to EPO, between 1992 and 2002, the number of patent applications filed in Europe, Japan and the United States grew by more than 40 percent. The number of patents filed with the European Patent Office reflects that trend, going from approximately 100,000 applications in 1997 to nearly 193,000 in 2005. (2011b)

Another great source of information is the Internet. Internet is a vital source of technology information. Its importance grows because of the increased popularity of on-line publication and the low transaction costs for retrieving on-line publications. (Lawrence 2011, 86-88)

Porter and Cunningham (2005, 73) stress growing importance of Internet in a process of searching information about technology (tech mining). In their book they provide a very comprehensive view on the tech mining process and provide numerous useful resources to consider. They also pay significant attention to understanding the importance of patents as a source of information (Op. cit. pp. 218-220).

Indeed, the combination of Internet technology and electronic patent databases represents a powerful way for people to explore IPR information. These companies, which manage to use it efficiently and effectively, can gain competitive advantage over these companies, which do not. Online public patent databases maintained by USPTO or EPO, provide access to millions of patent documents from around the world. Esp@cenet alone provides instant access to more than 60 million publications from more than 80 different countries. An important factor is, that Esp@cenet database is growing rapidly. Almost every day, new updates are available, which makes the database a vibrant source of relevant technical information.

Unfortunately, the awareness of companies about IPR and the existence of databases like Esp@cenet in Finland is very low, according to author's remarks from preliminary interview with an expert in the field of IPR (Hynynen 2010). Even if some companies hold their own patents and use Esp@cenet for patent document searching, many still lack the necessary searching skills and general knowledge about IPR protection system.

3.4 Conclusion

Patent information represents a large set of data, which if used properly and efficiently can provide invaluable knowledge. However, enormous effort is required to work with such large and complicated system of data (Hynynen 2010). This is why few SMEs use it nowadays in Finland. There is no doubt that free public resources like Esp@cenet make it easier for SMEs to handle patent information. But still, it seems that there is a lot of space for improvement.

If an SME manages to create a system for efficient and effective utilization of patent information, it will without any doubt gain superior knowledge about the relevant technologies and competitor groups. Given the current situation in Finland with extremely poor awareness of SMEs about IPR, this superior knowledge can turn into competitive advantage for the SME. On the other hand, this advantage may not last long, due to the fact that competing firms can try to adopt similar systems and it eventually can become an industry standard. However, this can also be argued. It is well known that in some technology intensive industries a phenomenon called “first mover advantage” exists. Early adopters of a new patent information system are believed to gain advantage over late majority, thanks to the time gap which an early adopter could spend on learning about the system and improving it.

Whether the gained competitive advantage will be sustainable or not, it is clear that there is enormous space for improvement in the way how SMEs are currently using patent information. While online databases like Esp@cenet provide a comprehensive source of raw data, there is still a need to store, organize, analyze, share and customize patent information.

4 RESEARCH

4.1 Research flow-chart

In order to address the research question, the process of this action research was divided into 4 cycles. Each cycle had one or more actions inside, which were aimed at answering particular sub-questions. These sub-questions were supposed to help to address the main research question.

Research cycles:

Cycle 1: Determining a need of the company

- Action: interview with the company representative about the needs of the company
- Analysis and reflection: The company view on how should a good tool look like and what are the features the company needs.

Cycle 2: Determining what is possible to do and what is being done in the field by solution providers

- Action 1: Interview with professional patent researcher
- Action 2: Secondary data research of available software solutions
- Action 3: Continuous cooperation with professional software developer
- Analysis and reflection: Ideas and conclusions about how IT can be used for the purpose of solving the company problem and what should be done.

Cycle 3: Implementing software development

- Action: Actual development of software and testing
- Analysis and reflection: prospects of the future tool.

Cycle 4: Feedback from the company

- Action: Interview with Klaus Grenberg about how the tool actually works and which are possible improvements for the future
- Analysis and reflection: To check whether all the needs of the company have been satisfied and to get an idea on what can be the next version of this soft and what should be improved.

Research flowchart

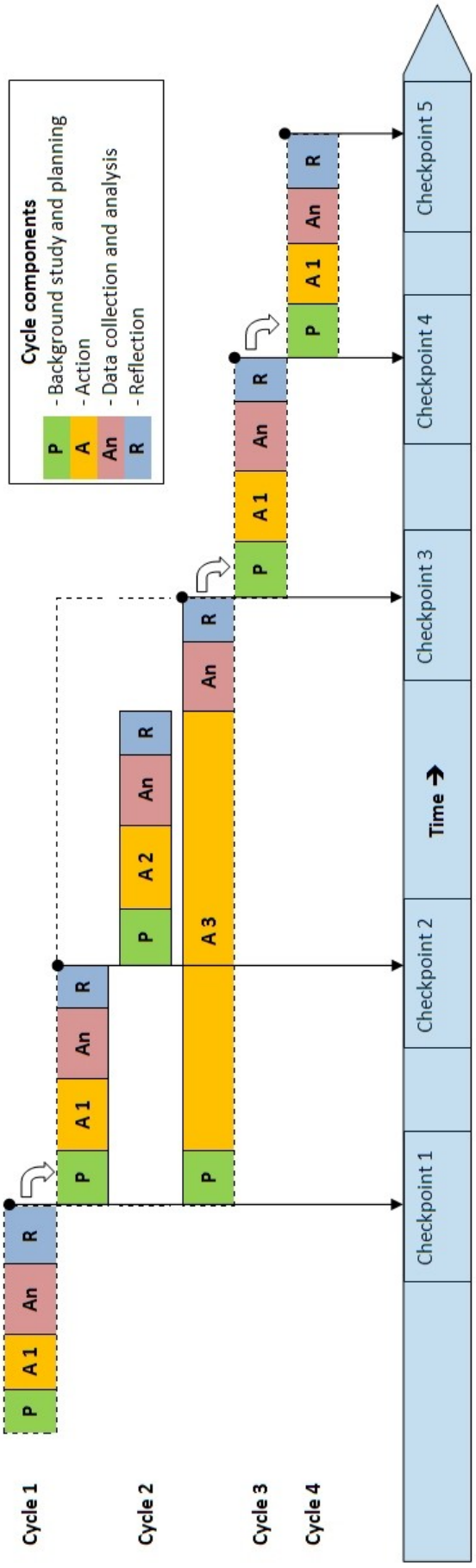

FIGURE 5. Action research process flowchart.

- Checkpoint 1 – Company perception of the problem studied
- Checkpoint 2 – The real need of the company revealed
- Checkpoint 3 – Characteristics of the desired tool defined. The decision whether a new tool should be developed.
- Checkpoint 4 – The tool is ready
- Checkpoint 5 – Feedback about the tool is collected and future prospects of the tools assessed.

It should be mentioned that cycles differed from each other by nature of the actions, which were taken during the course each cycle. Some of the actions were secondary data research, some were the interviews. One action was actually the software development. Due to the difference in nature of cycles, they were presented in a slightly different way. So the reader should not expect all cycles to be presented exactly the same, as it might seem from the Figure5.

4.2 Company Overview: AFM Forest OY

Overview

AFM Forest Oy is a company manufacturing harvester, processor, combi, energy wood and felling heads for demanding forest operations. The company is headquartered in Jyvaskyla, Finland and distributes its products through international chain of agents, partners and sales offices worldwide. The company can be described as medium sized, both in terms of revenues and staff.

Products and technology

Harvester heads, and other forestry machinery products, represent complex systems for cutting, piling, cleaning, marking and handling wood. Usually these systems are attached to specially equipped vehicles and are powered by hydraulic, pneumatic or electric flows.

One head can consist of several units, each responsible for particular action. Hypothetically one harvesting head can consist of tens of different patented inventions.

Competition and industry maturity level

According to company information, competition in the industry is limited to:

- Pentin Paja Oy
- Mecanil
- Usewood Oy
- Biologistiikka Oy
- Nisula forest
- Moisio forest
- Ponsse
- Logset Oy
- Lako forest Oy
- Lako Oy
- Arctic Forest Machines
- Kone Ketonen Oy
- Kesla Oyj
- Valmet
- Komatsu forest
- Silvatec
- Hultdins
- Quadco
- Tigercat
- Logmax
- Ecolog
- Rottne
- Sp Maskiner
- Timberjack
- Lokomo
- Waratah
- John Deere Forestry Oy.

According to Klaus Grenberg (2010), managing director of AFM-forest, there are not many new inventions in the industry due to the fact that competition is limited to 20-30 companies, only couple of which are active in filing patent applications.

This statement seems reasonable and is backed up by the fact that the whole industry of forest machinery is quite mature. Esp@cenet shows publications from the relevant field ("devices for felling trees") with priority claims dating back to 1940s (publications: FR1003116, US2612194). There is no doubt that since that time technology has stepped way further, but it is unlikely that given 70 years of development (prior art) there is still a lot of space for novel inventions.

Despite the overall maturity of the technology, currently there is a group of companies, which are active in filing patent applications in different patent offices worldwide. These companies are:

- Lako forest Oy
- Pentin Paja Oy
- Ponsse
- Kesla Oyj
- Waratah
- John Deere Forestry Oy
- Logset Oy
- Hultdin System Ab.

According to Esp@cenet database, they published 35 publications in 2010. Most of the documents were patent applications along with some patent grants and utility models. The fact that these companies are filing applications and receiving patent grants and utility model grants means that there are still technology areas to develop.

4.3 Cycle 1: Qualitative study of the company's needs

4.3.1 Background

The actual research question was influenced by Mr. Klaus Grenberg, the managing director of AFM-forest. However, the research question was not clear during the first contact. The initial proposal from the company was to create a database (for example, elementary Microsoft Excel) and fill it with patent documents of the company's interest, which could be stored and accessed in a quick fashion. Mr. Grenberg, who made this proposal, seemed to be the right person in the company to cooperate with. Due to his position in the company, it was clear that Mr. Grenberg was the person, who knew all internal processes. In addition to that, he was the only one in the company, who had basic understanding of IPR system and the ways it could be used to create value for the company. However, the proposed solution to the problem seemed to be too limited from the point of view of technical implementation.

First of all, patent information databases are being continuously updated with new publications almost on daily basis. For example, new European level publications, available from EPO via free online services, are released in hundreds (if not thousands) every Wednesday. And the trend shows that the number of published documents will grow in future (see Why IPR Protection System in 3.3). Esp@cenet is being updated with new publications almost daily. This means that if relevant data is once collected in a company's database (e.g. spreadsheet) it will get almost entirely outdated in a matter of few months. Therefore, it was clear from the beginning that spreadsheets like Microsoft Excel were not applicable for work in such vibrant environments as patent databases. There was a need to constantly collect the data from source databases.

Second, it was clear that there was a need for reporting and sharing information between different people/departments inside the company. These goals could not be efficiently achieved in a simple spreadsheet. The company would most likely need some work environment, where different users could search for patents and share their findings or report to their colleagues.

Research questions

Given the uncertainty about what was actually the tool, which would suit company's needs, it was necessary to first study the situation inside the company to understand which processes already existed and how they could be enhanced. The first action in this research was an interview with Klaus Grenberg and its goal was to broaden understanding of the company's problems and needs. The major questions to answer were:

Section A:

How and why the company is using patent information?

Section B:

What are the existing procedures for patent searching in the company?

What are current and desired roles of patent search in the company and which resources are spent on it?

Section C:

What are current expectations of a software tool, which could solve company's problems?

What should it do?

Section D:

What are the benefits, which company would achieve, if it had the desired tool?

Why this tool is expected to win competitive advantage to the company?

The qualitative method (an interview) was chosen on purpose and was intended to create a lively discussion, when a practitioner (managing director) could express his views of current processes, respective problems and possible ways to solve them. But on the other hand, it was taken into account that the interviewee was not familiar with recent achievements in Internet technology and his thinking and reasoning would be affected by that.

No certain expectations of results were expressed before the interview. The only thing which could have been expected was that the real need of the company would be understood. As it turned out later, this method was successful and during the conversation many important additional and unexpected issues were discovered.

4.3.2 Results of the action

Section A

Question 1: How the company uses patent information and the reason behind that?

At the moment the company is not using patent information a lot. The reasons behind that are lack of knowledge and skills and the high level of complexity of the process. From time to time people from marketing department check patents for the purpose of competitive analysis. But the company does not have a system, when patents are automatically checked before R&D department starts a new project.

As the respondent expressed the company is quite common Finnish SME, when it comes to working with patent information.

Two reasons to work with patent information were described as to **enhance competitive intelligence** and make **R&D processes** more efficient **(novelty search).** As the respondent described, by "novelty search" he meant a patent search, aimed at identifying all available patent documents, containing disclosures of relevant or similar inventions. The respondent explained that this is one way to ensure that the company's R&D department does not "reinvent the wheel".

It was also pointed out that patent information retrieved from Esp@cenet gives very detailed information about existing technologies, which can be used as a basis for further development. This is another reason why the company uses patent information - **Search for new ideas**.

The company strives to achieve these benefits by searching patent information:

- **Better marketing communication processes** (by benchmarking). Knowledge of competitors' technologies helps to better position company's own products.
- **More fresh ideas** for R&D department.
- **Time and money saving** in R&D (by novelty search). Novelty search allows avoiding unnecessary development work.

Question 2: Do you think your competitors share the same thinking with you about this issue?

Large corporations are very active in utilizing available patent information. These large companies have all necessary resources (people, systems), which SMEs lack.

SMEs (companies with up to 100 people or turnover of 15-20 million) are very passive in utilizing patent information and strive to outsource IP issues. But outsourcing is expensive and SMEs virtually never do it. A patent search can be very expensive to outsource, because general knowledge about IPR in companies is very poor and consultants (for example, private patent offices) have to do the additional work of defining the search and explaining the results of the search. In many cases this means that SMEs do not use outsourcing services at all.

Section B

Question 1: Describe existing procedures for searching patent information in your company?

Tools and storage

Esp@cenet, PatInfo, Google Search are used. After some interesting publications are found they are saved to the company's server or printed out. Information is stored on the company's server in pdf format. If some patent documents are missing in Esp@cenet database, the company orders full text originals from the patent office (government patent office, not private).

One problem that arises from such an organization of data on the company's server is that each saved publication is stored in an individual pdf-file, which makes it hard to search the data. Currently, the person, who saves publications on the server, needs to come up with a name for each pdf-file, which is relevant to the subject of the search (for example, a competitor's name).

Search and teamwork

The company has been continuously working with patent information since 1993. First, the only way to carry out a patent search was to ask from a patent office, which provided printouts of relevant publications. Although, during last couple of years the situation with patent searching has improved, thanks to Esp@cenet. However, the respondent still does not feel any major development since 93.

The respondent is the person, who searches patent information in the company. As he explained, this is natural that during an R&D project Finnish inventors never care about what others have already invented. When a new R&D project starts in the company, the managing director searches for relevant patent documents (so-called prior art) in Esp@cenet, finds relevant publications, prints them out and brings to the R&D lab. However, he noticed that R&D people usually are reluctant to read publications and keep bringing them back to his desk. It is worth mentioning, that these printouts are large paper folders full of A4 pages. These folders, combined with some publications stored on the server, are also used by the managing director as an archive of the publications for future R&D projects. There is also some non-patent information used in the process of search, such as data from Internet (competitors' websites).

Sometimes, the patent search is initiated by sales people, who inform the managing director about a new technology in the market. First, the managing director checks the novelty of the invention/technology in patent database. If it proves to be novel, he transfers information to the R&D department, so R&D staff can analyze it.

The respondent admits that the patent search is in most cases based around the competitors and their publications. He barely can imagine how a patent search can be done on a basis of some certain technology. For example, the company's products consist of numerous hydraulic systems. But in view of the respondent, it would be very hard to find relevant patent documents from such a broad field of technology as hydraulics. Therefore, using words like "hydraulic system" during a patent search is not going to give relevant results. Another problem is that in general hydraulic systems are extremely complicated and hard to understand, even if all detailed descriptions are available. For example, the company once found a publication describing a system, which in their opinion could not even work. Therefore, the respondent has no idea how patent information can be efficiently used for technology intelligence.

Question 2: What are current and desired roles of patent search in the company and which resources are spent on it?

In general the respondent admits that the company is not using patent information as it should. First of all, the company does not have tools. Second, employees do not have required knowledge about IPR and the current tools are too complicated for them.

The respondent recognizes that the process of searching and following patent information should be recognized by the company as mission critical. This is because of potential losses if patent infringement happens. However, he claims that in companies of their size (including them) this process is far from being recognized as mission critical. According to the respondent, situation with IPR in Finland is outstanding. Finnish companies can run large R&D projects, which take years to develop, without any IPR protection.

From the point of view of the respondent, a patent document search can serve as a first step from the companies willing to make their first steps in the IPR world. In view of the respondent, the biggest benefit, which a software tool can bring to the company, is making the patent search more efficient and simple. Even if results are not very accurate and complete, a tool with user friendly interface can still help the company in commencing the work with patent information.

Resources involved

The respondent estimated that the company currently spends 500 euro per year on patent search in terms of time and salary. From time to time there is additional cost of purchasing patent publications from the patent office. This cost is estimated to range in tens of euros. The users of patent data are technical manager, sales manager and two employees from the R&D department. In total 5 persons are working with patent information in the company, including the managing director, who makes searches.

In general, the company works with patent information 3-4 times per year, when new R&D projects start.

Section C:

Question 1: What are current expectations of a software tool, which could solve company's problems? What operations shall it perform?

One problem is that people from the R&D department in the company just do not know how to search patent information. But according to the respondent, if there was an **automatic system, which could deliver all publications** according to listed keywords or company names, it would be very useful for the company. Now people from the R&D department are not interested in working with patent documents, because they cannot search them and think that it is not worth their efforts.

According to the respondent, Esp@cenet is not very handy even for an experienced researcher. Also it does not solve the whole problem. There is a need to know whether the patent is valid, whether there has been a right transfer, who the real owner of a patent is, date when it will expire and many other important issues.

Another problem is that in Esp@cenet there is not enough **support material**, which helps to read and understand publications.

Simplicity was marked by the respondent as the most important feature. In addition to that there could be a service (for, example a call center), which would provide **consultancy on reading and understanding** publications.

Speed, design, availability of analytical and statistical features and flexibility of the software are not important in view of the respondent.

Price and comprehensiveness of data were mentioned by respondent as rather important issues.

Section D:

Question 1: What are the benefits, which company would achieve, if it had the desired tool?

Cost savings in R&D by being aware of current technology level (not infringing anyone's IPR) and also taking advantage of availability of numerous fresh ideas for further development.

Therefore, the company can avoid losses in development work, court settlements and reduce prototyping and testing costs.

Another benefit of owning such a software tool is that the search can be done inside the company, and all information is saved. The respondent explains, that it is not the same when one searches patent information himself/herself or when one outsources a patent search to a third party. The respondent emphasized that when he searched patents himself he accidentally found many interesting and relevant publication from technology areas or companies, where he would have never tried to search them. On the other hand, when a patent search is outsourced to a private patent office, the research question has to be stated precisely and the area of search must be well defined. Therefore, no unexpected, but important publications would be found this way.

Summary: characteristics of the desired tool

To sum up the results, the respondent was asked to give scores from one to five to seven different characteristics of the desired tool, which in his opinion would satisfy the company needs. Score one stood for “not important at all” and five stood for “very important”. The respondent was given a total of only 18 scores in order to make sure he thought carefully about each characteristic and compared its importance to others. It also reflected the fact that any development project has limited resources and has to have a clear focus. The results are summarized in the Table 2.

TABLE 2. Characteristic of the desired tool as perceived by the company.

The purpose of the tool	Novelty search, competitor surveillance, source of new ideas for R&D, avoid patent infringements, enhanced knowledge about competitor's technology, transfer of patent information between employees, organization and storage of patent information
The company's expectations about the system	Automatic system which could deliver all publications according to keywords (competitor company names). Support for reading and understanding publications is needed.
Speed of search	1 – **2** – 3 – 4 – 5 Speed of the search is not very important. One search can take from 1 to 5 minutes.
Analytical and statistical resources	1 – **2** – 3 – 4 – 5 Not very important due to limited amount of competition
Flexibility (adaptive to different needs and situations)	**1** – 2 – 3 – 4 – 5 Not important due to very limited needs of the company
Simplicity (easy-to-use, no extensive training needed)	1 – 2 – 3 – 4 – **5** Very important. Considered to be the most important factor by the company representative.
Price	1 – 2 – **3** – 4 – 5 Price should not be as high as other professional software solutions
Comprehensiveness and reliability of data	1 – 2 – **3** – 4 – 5 The data should be comprehensive enough. Esp@cenet provides a good coverage.
Design	**1** – 2 – 3 – 4 – 5 Not important as long as it is simple
Likert scale. 1- not important at all, 5- very important Maximum of 18 points (+/-1 point) allowed	

4.3.3 Reflection

In general, it seems that the respondent has an understanding of how the company can benefit from patent information. However, it has become obvious that the respondent has a very limited understanding of how these benefits can be achieved.

According to the respondent, the company does not have the necessary system or tool installed. The tools currently in use do not meet the company's objectives. These tools are Esp@cenet, PatInfo and Google search engine and, given the company's goals, it is obvious that the company needs a more sophisticated tool. But it seems that the tool sophisticated enough does not exist. At least, the interview gave an impression that the respondent had never seen anything which could solve the company's problems. This is also supported by the proposal of an Excel database as a solution to company's problems. This important observation led to the assumption that the respondent, even if he could recognize the problem, could not address it properly due to lack of technical knowledge and awareness of available solutions in the market.

The respondent also claimed that they were a typical Finnish SME in terms of work with patent information. This statement also pointed out that competing companies in the industry did not use any other tools than Espacenet, PatInfo or Google. If this information proved to be true, it would be a chance to expand the outcome and benefits of this research to many other companies in similar technology intensive industries in Finland and other EU countries.

In order to proceed with the research, the decision to study the market of relevant software was taken. Even if the respondent had never seen any tool, which could suit the company's needs, it was necessary to check if some relevant software already existed and could be used by the company.

It was also necessary to learn in general about how recent development in software (Internet technology in particular) could address the company's problems. It was recognized by the respondent that Esp@cenet provided good data coverage. It meant that hypothetically there could be another enhanced tool, based on the data coverage of Esp@cenet, but providing more sophisticated features.

4.4 Cycle 2: Determining what is possible to do and what is being done in the field by solution providers

4.4.1 Background

In the first cycle of this research, the company needs were deeply studied. But at this point, there were still couple of unclear issues. First of all, it was necessary to find out more about how patent search should be done. There was a need to take a close look at the process of searching from the point of view of professional researcher. It was also important to find out a professional opinion of which characteristics of the desired tool were most important and compare the results to the opinion of the company representative. That is why an interview with a professional patent information researcher from ELY-Keskus was chosen as a method to solve this question. This information would then be used in making a decision about which features and processes should be realized in the future software tool.

Another relevant issue to deal with was to study the current situation in the market of patent searching software. Even if the company representative claimed that he had never seen any tool, which could suit the company's needs, it was still unclear whether there was a ready solution in the market or not. In other words, the evidence of the respondent was clearly not enough to judge the availability of a ready solution in the market of software. Therefore, a study of secondary data such as patent software reviews was chosen. The Google search proved to be very helpful in identifying major solution providers in the field of patent searching software.

Another observation from the first cycle was that the company representative did not have enough knowledge about opportunities, which internet technology could offer to solve the company problem. In order to make sure that the future software tool would be up-to-date from the point of view of technical implementation, it was decided to study which could be the most suitable platform for creating the tool. These questions were addressed to a young software development company from Moscow and its CEO Nikita Bashmakov.

Research questions: Cycle 2

The overarching question for this cycle was defined as:

What can be an efficient, up-to-date technical solution, which can satisfy the company need?

This overarching question led to a set of sub questions, which were broken into 3 logical parts, each representing particular action:

1) Action: Interview with Jouni Hynynen, innovation manager from ELY-Keskus
   Question to deal with:
   Describe the process of a patent search from the perspective of a professional IP advisor?
2) Action: secondary data research.
   Questions to deal with:
   Which are software tools currently available in the market, which could suit the company need in patent searching?
3) Action: continuous interactions with CEO of one software development company
   Questions to deal with:
   Define opportunities which recent achievements in IT (Information technology) can provide for satisfying the company need?
   What can be a tool suitable for the company needs?

Purpose and expectations

These three actions altogether were expected to provide a comprehensive answer to the set cycle question. These actions were chosen in order to help to understand the issue from different points of view. The first action was expected to provide insights on how the patent search should be done in general. It was also expected to provide a professional opinion of which characteristics were most important in the desired tool, as opposed to the opinion of the company representative. The second action was expected to provide information about how software solution providers addressed the patent search in their products. The third action was supposed to provide general knowledge about the development of relevant IT and help to assess

critically software solutions, which had been detected during the second action. In turns, the results of the second and third actions together would serve to critically analyze whether the development of a new tool was worth the effort or the company need might be satisfied by the existing software solution. It was expected that when the results of these three actions mixed together with results of the first cycle, they would well address the initial research question and advise whether a new tool should be developed or not and which operations it should perform.

A. Action 1

The aim of this action was to provide a practical insight into how the patent search was being done by a professional researcher. This action was assumed to provide a knowledge about which were the most critical and problematic stages of the patent search. This action was expected to reveal the real need of the company, as contrasted to the perceived need of the company, which had been expressed during Cycle 1 (see Summary in 4.3.2) by the company representative. It was assumed that a professional view on patent search would be different from the view of the company representative.

It should be mentioned that not all professional patent researchers would be suitable for this interview. For example, in national patent offices, when a patent examiner processes a patent application he/she carries out a patent search (so-called prior art search). But this patent search is different from the one the company was interested in. Prior art search in patent databases by a patent examiner was considered to be a lot more thorough and precise, than the actual need of the company was. What the company needed was a less-rigid, lighter type of patent search, and it was the one that professionals from ELY-Keskus did as their day-to-day working routine. This type of search did not have to be as precise as the one of a patent examiner, but at the same time it was a lot less time consuming and seemed to provide enough useful information to the company. (Grenberg 2010)

Mr. Jouni Hynynen, a professional patent researcher from ELY-Keskus with 15 years of experience in patent search, was interviewed in order to tackle this issue. It was expected that the respondent could provide a valuable insight into how this type of patent search could be done efficiently and what could be expected from the patent

searching software. It was also expected that given such a long experience in patent search, the respondent would help to understand the trends in how the patent search was done by Finnish companies and inventors. It was important to know these trends, because it was previously discovered that state of awareness of companies and inventors of IPR in Finland was very poor (Grenberg 2010).

B. Action 2

The purpose of this action was to define a set of software solutions, which could fully or partially satisfy the company need. Although, the company had never used any software before, this fact alone did not mean that there was nothing available in the market, which could satisfy the company need.

It was expected that some suitable software solutions would be found. However, the main goal of this action was not to find a perfect match, but to learn from other tools about what could be done.

It was also clear that the major software developers had not been considering SMEs and private entrepreneurs as their target market. There were numerous software products available for working with patent information for larger companies. These software packages were known to be very expensive and had never been considered as an option for an SME or a private inventor. Another fact was that in many cases, these software packages required special and extensive training, which SMEs or private inventors could not afford.

C. Action 3

This action was planned to broaden the overall knowledge about the current development level of IT technology and ways how it could help to solve the company need. The results of this action were expected to provide a framework of what could potentially be done from technological standpoint, including opportunities and limitations. There is no doubt that IT is developing very rapidly and there are many opportunities in the field. One of the clear benefits is that numerous open source software solutions exist and continue to be developed. These open source solutions can be freely utilized as a basis for further development and can save a lot of time, money and effort during the process of development of the tool.

Nikita, being a CEO of the software development company, already had experience of developing similar systems and in general was considered to know the process of developing custom software solutions very well. This action was planned to close the inquiry part of the research. The results of this action combined and analyzed together with previous two actions were expected to shape the decision whether to develop the software or not and also guide through actual software development process. Upon completion of this action it was expected that all information relating what exactly the tool should do would have been collected. This action took form of a continuous process of interacting with Nikita and his team of software developers (programmers, designers etc.). As soon as some important issues were uncovered during action 1 or action 2, the information was forwarded to Nikita for further analysis.

4.4.2 Results of the action

A. Action 1

Question 1: What is the current situation with awareness of SMEs and private inventors about patent information?

It was discovered that many SMEs and inventors in Finland have very poor understanding of how they could benefit from utilizing patent information. According to the respondent it is first of all because of a small size of these companies. Most of the time managerial effort is put on some other issues, and there is not enough time and resources to learn how to utilize patent information. Second, the prevailing part of Finnish SMEs consists of subcontracting firms or so-called B2B businesses. In many cases they are not selling to end users and competition in such markets is limited to fewer companies, if compared to B2C markets. This way, the need to protect its inventions and products is not very high for Finnish SMEs.

According to the respondent's experience, this state of affairs had been quite stable until 3-4 years ago. And then it started to improve. One reason was that innovation managers (like the respondent) from different organizations like ELY-Keskus had been promoting importance of IPR quite heavily. Basic courses about IPR had been organized in numerous schools and universities. And the graduates from these

schools are now fostering use of IP information (such as patent information) in Finnish companies. Another reason is that awareness about Esp@cenet has grown in previous 3-4 years. The respondent also made assumption that this situation is the same all around the Europe.

Question 2: Describe the process of patent search?

Tools in use

Esp@cenet and Google Search are used to carry out a general search or so called novelty search. First Espacenet is used to check whether some similar patent documents exist. Then if the respondent can find some publications where the keywords are used in this combination, he continues the search in Google. This is done to prevent the invention from unnecessary disclosure. This is because several keywords put together in a combination can themselves represent a novel invention. But when revealed to Google search engine, an invention can lose its novelty. According to the respondent, these two tools give a good insight into technology level. Google Search shows what is currently in the market, and Esp@cenet shows what is going to be in the market in the near future.

Esp@cenet is quite popular among patent researchers. One reason is that it is easy-to-use. Another reason is that Esp@cenet is an official web-site and is backed by EPO, which gives it corresponding status of a credible and trustworthy resource.

Search process

In most cases companies do patent searching on some particular occasions, for example beginning of a new R&D project. But seldom do companies monitor patent information on constant basis. Sometimes it causes problems, when during an R&D process some development happens in a patent database. For example, a competing company can publish a patent application for a similar invention and this way harm the R&D project badly if an action is not taken early enough. This means that patent information shall be continuously monitored in order to be up-to-date.

According to the respondent, the same situation is with private inventors. Private inventors fear checking patent databases because they are afraid to find out that

their invention is not novel and they usually are too focused on their own studies and achievements.

In general, currently both the respondent and his clients do the patent search manually by trying to match appropriate keywords in Esp@cenet or Google search. This creates a large set of problems. For example, one problem is inability to save a search history. Once found appropriate keywords easily get forgotten and the search process has to start from scratch every time the company or inventor searches for patent documents. Another problem is that for monitoring purpose, it is necessary to do the repetitive work of retyping the same keywords in search fields, every time there is a need to check for updates from Esp@cenet or Google. Another challenge in doing a patent search is reporting the results. When several publications are found there is a need to store and report them somehow. Esp@cenet has a feature, called "My patent list", which partly solves this problem. However, it provides only one folder for all publications, but there is a need for more folders and possibility to continue the search after the publications are saved.

One important remark was made about reading and understanding patent documents found from patent databases. US patent documents have to be written the way that a "layman" should understand. This makes US patent documents very long, but understandable. However, what concerns European patent documents – they are quite short, due to the fact that they are allowed to be written the way that only relevantly skilled-in-the-art persons can understand. According to experience of the respondent, sometimes this fact makes some European patent documents quite complex and ambiguous. For example, he had come across patent documents, where it seemed that some of the claims had been formulated just to confuse the reader. For such patent documents, the respondent had to ask help from professional patent agents, who could translate the complex text into a plain and understandable language.

Other tools and solutions for patent search

The respondent expressed that his clients did try to solve abovementioned problems with patent search themselves, but he has not yet seen any significant success. There are some software solutions, which the respondent has tried, for example

Innography (Innography 2011). The respondent claimed that these type of software solutions and Innography in particular are too complicated and detailed. He shared that there was no need for such a deep patent search in SMEs. It was concluded that this type of software solutions might be appropriate for large companies, who could afford it both in terms of manpower and in terms of subscription fees and prices.

Summary: characteristics of the desired tool

To sum up the results, the respondent was asked to give scores from one to five to seven different characteristics of the tool, which in his opinion would satisfy the need of AFM-forest. Score one stood for "not important at all" and five stood for "very important". The respondent was given a total of only 18 scores in order to make sure he thought carefully about each characteristic and compared its importance to others. It also reflected the fact that any development project has limited resources and has to have clear focus.

In this case, the responded used one extra point (total of 19 points) to emphasize importance of "Simplicity" feature. The results are summarized in the Table 3 .

TABLE 3. Professional perception of the desired tool, compared to the company view.

Characteristic	Professional view	Company view
Speed of search	1 – 2 – 3 – **4** – 5 One novelty search in Esp@cenet usually takes 2 minutes, if the case is simple. The respondent finds appropriate keywords by trial and error method; therefore, speed of the search is important.	1 – **2** – 3 – 4 – 5 Speed of the search is not very important. One search can take from 1 to 5 minutes.

Continued on the next page

The table begins on the previous page

Analytical and statistical resources	**1** – 2 – 3 – 4 – 5 The respondent does not perform much analytical work in his profession.	1 – **2** – 3 – 4 – 5 Not very important due to limited amount of competition
Flexibility (adaptive to different needs and situations)	1 – 2 – **3** – 4 – 5	**1** – 2 – 3 – 4 – 5 Not important due to very limited needs of the company
Simplicity (easy-to-use, no extensive training needed)	1 – 2 – 3 – 4 – **5** Considered to be the most important issue.	1 – 2 – 3 – 4 – **5** Very important. Considered to be the most important factor by the company representative.
Price	1 – 2 – 3 – **4** – 5 Price should be competitive compared to other more complicated alternatives. Prices shall not exceed 1000 EUR per year per one user.	1 – 2 – **3** – 4 – 5 Price should not be as high as other professional software solutions
Comprehensiveness and reliability of data	**1** – 2 – 3 – 4 – 5 No need to have precision and too deep coverage, as many alternative services provide.	1 – 2 – **3** – 4 – 5 The data should be comprehensive enough. Esp@cenet provides a good coverage.
Design	**1** – 2 – 3 – 4 – 5	**1** – 2 – 3 – 4 – 5 Not important as long as it is simple
Likert scale. 1- not important at all, 5- very important Maximum of 18 points (+/-1 point) allowed		

B. Action 2

IP Software

Many different software tools can be found in the market nowadays, with the prevailing part of them marketed and sold online. The available tools vary in many ways. Some tools are more sophisticated and focused on complex statistical analysis; some are lighter and more easy-to-use. In order to review this mass of solutions in efficient manner, they were structured in several groups, according to their purpose:

Statistical analysis of patent data

One of the first software solutions, which were found, were 4 “tech mining” software tools, discussed in details by Laura Ruotsalainen in her research work “Data Mining Tools for Technology and Competitive Intelligence”.

These tools are **Aureka**, **STN AnaVist**, **OmniViz** and **TDA – Vantage Point**. All of these tools are aimed at providing statistical analysis of information contained in patent documents. Although in her research Ruotsalainen describes Aureka and AnaVist as tools which are easy to use, they are still quite complex in their interface. However, this seems to be true that, if compared to other two software tools, these seem to be quite easy-to-use.

After a brief study, it became obvious to the author, that these tools require professional knowledge of patent documents and at least basic knowledge of statistics.

These tools all have their own information databases, and some of them are even capable of working with many different sources and types of patent data.

Browsing and collecting patent data

These tools are numerous and they usually are in form of desktop software, which operates as an internet browser and allows users to work with several free public patent databases, like Esp@cenet, USPTO, Depatisnet and others. This allows users to operate more efficiently with public patent databases from a single platform. One example is **IP-Discover**, which is a desktop browser. It allows users to search, download, and manage patent documents from popular free public databases. The

tool does not have any tools for analysis of data. Another example is **Priorsmart.com** online service, which allows users to search patent documents from major patent offices from a single interface.

Another example of similar tool is **IP-Magnet**, which is a light and simple tool for collecting and downloading patent documents from major free public patent databases. Virtually the same service is **PatentPleeze**.

What these tools have in common is that in most cases they are sourcing patent data from free patent databases provided by EPO, WIPO, USPTO or other patent offices worldwide. Prices for such tools are starting from as less as 45 USD per year, which makes them extremely cheap and affordable. Moreover, there are some free resources like **PatentRetriever**, which provide free downloads of US, European and PCT patent applications.

To sum up, tools from this group focus on making downloading and browsing of patent documents more efficient. In essence, the value that these tools add is merely saving time.

Searching tools

Another group of software tools is comprised of comprehensive solutions for searching patent and non-patent data. These software solutions provide powerful features for searching, filtering, sorting and analyzing different sets of information. They source data from patent, trademark and various non-patent databases. As long as the main focus is on the search, source databases are usually numerous, large and extensive. Some tools offer alternative ways of searching like, for example, semantic/contextual searching. Examples of such software tools are: **Innography**, **FamPat**, **Patent Insight PRO**, **PatBase, Total Patent.**

Some solutions providers specialize on industry specific searching like for example chemistry searching. For example, **SureChem** or **PatBase** provide special features for patent chemistry search.

Pricing and target customers

Regardless of their purpose, all revised tools could be clearly divided into two groups: professional and semi- or non-professional. The majority of the tools fell into the first category. Professional tools were significantly more expensive and complicated than the other group of tools. Most vendors of professional tools did not publish their prices, except for few cases. One searching software tool was discovered to cost around 3500 EUR per year per one user. This fact supported the idea expressed by Mr. Hynynen and Mr. Grenberg, both of whom stated that IP software is usually expensive.

Another important finding was that tools from the professional group were quite complicated. Given the aims and resources of AFM-Forest, virtually every tool had too much to offer and, therefore, too much to charge for. Every tool had its own strong and weak points, but none seemed to deliver exactly what the company needed. Even if **PatBase**, for example, could potentially solve company problems, it was clear that the tool offered too many additional and unnecessary features.

On the other hand, tools from semi- or non-professional group seemed to lack features and could not entirely solve the company problem. For example, **IP-magnet** or **IP-Discover** could solve one part of the problem, which was searching, downloading and organizing patent documents. But these tools could not solve the entire problem, as described in the first cycle of this research. In particular, these tools do not provide any features for continuous monitoring (or watching) patent documents from desired technology fields or competitor groups.

C. Action 3

As a result of this action a new method for searching patent information databases has been developed. The disclosure of the method and invention was filed to USPTO. Extracts from corresponding provisional patent application document are available in Appendix 4. Below is provided a brief description of the method.

Technical solution

The technical solution includes recognition that while computer patent database powered by a search engine gives a researcher a fast way of accessing vast amount of patent information, this alone is not providing a complete solution to the problems of patent information search. Moreover, this technical solution includes recognition that during the information search from a patent information database, regardless of the purpose of the search, the core process is to formulate a proper mask of the search, rather than to retrieve and download some particular piece of information.

Therefore, the technical solution for the real company need (see Action 1 Summary in 4.4.2) can be a system and software for creation, revision, storage, sharing of masks of search for one or more patent information databases as well as for creation of researcher's own database, which is filled with use of and according to abovementioned masks of the search. As a result, every time a researcher starts a new patent information search he creates a mask of the search, where he specifies which patent information database/s will be searched and for which keyword/s in which field/s. Then the mask of the search can be saved and can be executed at any point in time, providing retrieved data, which can be saved to researcher's own database. Therefore, this system eliminates the need for manual repetitive work of entering the same mask of the search into different patent information databases over and over again across time and enables researcher to obtain an up-to-date, comprehensive, combined chunk of information from different sources.

Sourcing the data

The target data coverage was set to be equal to the coverage of Espacenet or around 60 million patent documents worldwide. Operating such a large piece of information

requires a powerful database management system (DBMS) and corresponding hardware and software. But there were number of free public patent databases, such as Esp@cenet, USPTO online databases, Depatisnet, WIPO online databases and range of other searchable online databases from different patent offices worldwide.

There were basically two options: either a) to collect all the data in-house and run it on the company's own DBMS or b) collect only search results and act as a proxy between a researcher and online patent searching engines of databases mentioned above. These two approaches were very different by their nature. When the first one required storing and searching data in-house, the latter outsourced storage and search to 3-rd parties, narrowing the role of the system down to a simple proxy. This would call for many discrepancies in the results these two options could achieve.

Option A (in-house approach)

TABLE 4. Strong and weak point of an in-house approach.

Strong points	Weak points
Faster search (no lead times)	Unclear where and how to get the raw data (buy, download, parse)
Fewer limitations to search (amount of keywords and retrieved publications allowed)	Significantly more resources involved (powerful hardware and software required)
Add custom data (like commentary for retrieved documents)	More maintenance required
More reliable (no need to rely on 3-rd party software & hardware)	
More features can be installed (analysis and organization of data)	

Faster search (no lead times)

When data is available in-house, numerous powerful search engine software tools can be used to efficiently search and process the data. It is always better to have raw data “on your table”, instead of drawing it from some external system. It also cannot be expected that these external systems work consistently fast, especially if we are talking about sourcing data from free public resources like those of EPO. In case if there is an in-house database all resources of the hardware are exclusively allocated to processing requests and it is easy to achieve consistent and fast work.

Fewer limitations to search

In case there is an in-house database and enough resources (hardware & software) to operate it, there is no need to set any limitations for the amount of keywords per one search etc. Limitations would make sense for mass services but not for services with 10-100 users.

Add custom data

It basically does not matter which information to store in the database. For example, patent data package, bought/downloaded/parsed from any source, can be supplemented in the future by user commentaries, pictures or virtually any other data.

More reliable

There is no need to rely on other parties, who provide data storage and searching services. All raw data and searching processes happen within your reach and control.

More features can be installed

If it chosen to store all data in-house, than all processes related to organization and analysis of data can be done with more efficiency.

Unclear where and how to get the raw data

This is the critical issue. It can be expected that 60 million patent documents can consume hundreds of gigabytes of disc space. There are several free online services operated by EPO, which potentially could become sources of data. These services are

Esp@cenet and Open Patent Service (OPS). However, both are not suitable for downloading the whole data set, which they cover. Moreover, any automatic/robot access to Esp@cenet is prohibited by EPO, which makes bulk downloads impossible from this resource. OPS tool gives significantly more freedom for accessing similar data set, but it also has quite strict limitations.

Another option is to purchase data. There are numerous governmental and non-governmental entities, which sell raw patent data. According to private inquiry made for the purpose of this research, EPO charges approximate 25 000 EU for providing a hard copy of databases covered by Esp@cenet.

Significantly more resources required

According to rough estimates the required patent data set can require several hundreds of gigabytes of hard drive disc capacity. Moreover, DBMS and search engine software should be powerful enough to deal efficiently with this mass of data.

Maintenance

No doubt that the whole system will be more complicated than in case with outsourcing. This means that more maintenance is required.

Option B (outsourcing approach)

TABLE 5. Strong and weak points of an outsourcing approach.

Strong points	Weak points
Significantly fewer resources required (both software and hardware)	Limited searching features (amount of keywords and retrieved publication)
Simple and light system (the system is just a proxy)	Slow search (long lead times)
Less maintenance	Limited amount of features (analysis and organization a data)
Updates from plurality of data sources	Weak reliability (dependency on 3-rd party services)

Significantly fewer resources required

Due to the fact that the system serves as a proxy between the user and the actual search engine, it will require significantly less hardware capacity and can be run by more simple software. In other words, the system only enhances data flows between a user and an existing patent searching service. In this case the system operates and stores the data related only to the process of searching, such as keywords or search history.

Simple and light system

Such a system is a lot easier to build. It can be run with fewer applications. For example, there is no need in sophisticated DBMS and search engine software.

Updates from plurality of data sources

In case the data is sourced from numerous different online patent databases, there is no need for updating. Patent databases are being updated almost daily, and all these updates will be available for user the very same moment they appear in the source database. In this sense, there would be no difference in coverage of the future tool and any online patent database it is sourcing data from.

Limited searching features

The future tool would have all the search limitations of the online search engines it is sourcing from. For example, in Esp@cenet there is a limitation of 10 keywords per each search field. This means that in case user tries to send a larger query, the future tools would have to first break it into several smaller queries and then to collect and merge data from each one to form a reply to the user. This would definitely affect the speed of the search in a negative way.

Slow search

Even if the queries are not exceeding limitations of 3-rd party search engines, there will be a need for merging (parsing) the data received from these sources. For example, in response to a search query Esp@cenet sends back the data in HTML, which requires parsing before it can be forwarded to the user of the future tool. In

case there are numerous sources, there also will be a need for merging parsed data from several sources into one stream.

Limited amount of features

In case data is not stored in-house, there is no way to execute such operations as analysis of data. The only way to make analysis of data (statistics, charts, graphs) is to have it in the company's own database, which is not the case for this option.

Weak reliability

Quite obvious that if one of the source services fails to provide data, the future tool will fail too.

4.4.3 Reflection

During the Action 1 of this cycle the actual need of the company was revealed. An interview with professional patent researcher enhanced understanding about what were the areas for improvement in the process of a patent search. As expected, views of the professional and the company regarding this issue differed. Surprisingly, it was discovered that the respondents had contrasting views on how fast the speed of the search should be (see Action 1 Summary in 4.4.2). Perhaps, this was caused by the fact that the scope of company representative's thinking was limited only to following patent documents from the set of competing companies. Indeed, if the competitor names are well known, they themselves can serve as keywords ("Applicant" field), and there is no need to find appropriate keywords as for example when doing a novelty search. As Mr. Hynynen (2010) expressed, a novelty search sometimes can take up to 30 minutes of trying to find and match proper keywords by a trial-and-error method. That is the reason why Mr. Hynynen emphasized the importance of the speed of the search. For example, if in the new tool one search takes 5 minutes (as proposed by the company representative) it will take hours to find proper keywords for a novelty search. Therefore, it was clear that the search speed of the new tool had to be fairly high.

According to Mr. Hynynen (2010), in general SMEs in Finland do not know much about patent information and how it can be utilized. Interview with the company representative (see Appendix 1) showed that one of the most obvious and easy to understand reasons to use patent information was competitive intelligence. It seemed to be one of the reasons, which the company representative understood better than any other. In fact this finding can be used in the future development of the new tool, and special emphasis shall be put on providing users with efficient way to follow patent documents of companies of their interest. Perhaps, if the future tool is promoted as a tool for patent-based competitive intelligence, it will be easier for Finnish SMEs to understand and adopt it.

The second action identified a range of similar software solutions available in the market. It was discovered that Esp@cenet is one of the most popular, according to experience of Mr. Hynynen (2010) and Mr. Grenberg (2010). Both respondents also agreed that the most important characteristic of the new tool was simplicity. This

implied that the future tool could be based around the interface similar to the one of Esp@cenet.

Esp@cenet could also be used later as some kind of a starting point or a beacon for positioning the future tool in minds of potential users and customers. Esp@cenet was discovered to be quite-well known by SMEs in Finland. According to Alexa Web Information Company (2011) Esp@cenet also seems to be popular in some other European countries, for example Germany, Switzerland, Austria, UK and Italy. The new tool, perhaps, could be positioned as a more powerful alternative to Esp@cenet. It will significantly improve and ease marketing communication of the future tool. On the other extreme, other professional software solutions can be used as another beacon for marketing communication.

Positioning of the future tool in minds of potential users shall look like expressed in the Figure 7.

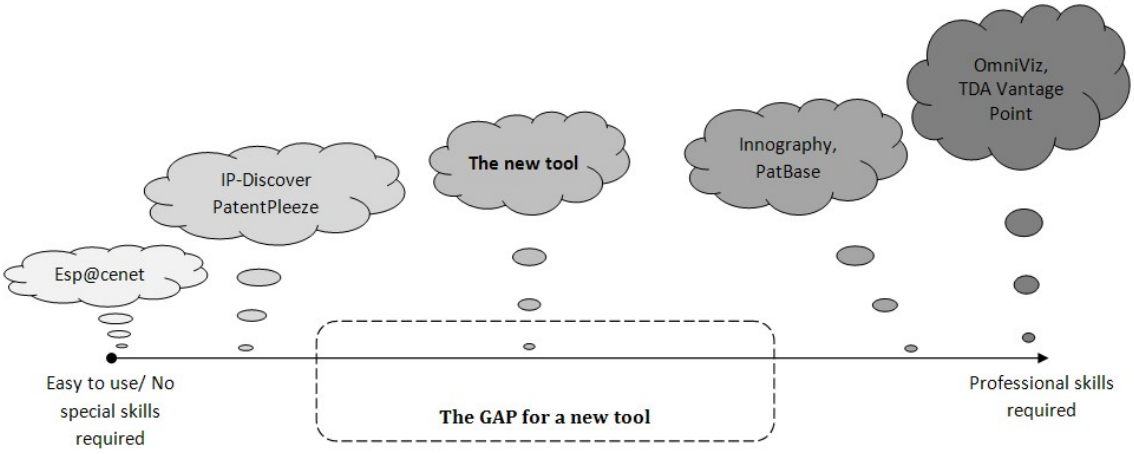

FIGURE 6. The gap for positioning of the new tool.

The study of the available software solutions also pointed out the fact that none of the software developing companies had targeted SMEs as their primary customers.

Most of the software tools seemed to have either too much or too few features to offer. This called for development of a new tool, which would be exclusively targeted to needs of SMEs in their patent searching activities.

Action 3 and Action 2 of this Cycle together made it finally clear that a new tool had to be developed. It was discovered that the gap between professional and non-professional software tools available in the market was quite large. This meant that there was a lot of freedom to operate and create a new software tool.

4.5 Cycle 3: Implementing software development

4.5.1 Background

In first two cycles the real problem of the company has been revealed, available solutions studied and a new technical solution proposed. During the Cycle 2 (see Reflection in 4.4.3) it was also discovered that significant freedom to operate exist for creation of a new software tool, which will be focused exclusively on needs of technology intensive SMEs.

Research question: Cycle 3

How the proposed technical solution (see Action 3 in 4.4.2) can be implemented in practice?

This question was addressed to the software development company of Nikita Bashmakov.

4.5.2 Results of the action

The software was built according to a technical solution (see Action 3 in 4.4.2). It was based around a simple concept of creating, storing, sharing of search masks between different users of the software. Search masks consisted of a set of keywords for patent search. According to these keywords, patent documents could be retrieved from the source databases. Search masks could also contain non-patent data, like for example user commentary for each patent document of the mask itself.

The actual development of the soft was carried out by professional software developer Nikita Bashmakov and his team of programmers. All software used in the process of development was open source software including, but not limited to, Linux (Debian) operating system, Apache web-server, MONO, MySQL server, Sphinx search engine. The tool was developed as a Software as a Service (SaaS) and was temporarily installed for testing purposes on one of the servers of Nikita's company in Russia. SaaS architecture was chosen to make sure that AFM-forest and other potential users of the soft did not have any problems with deploying the software on their machines. Given the availability and speed of the Internet connection in Europe, SaaS seemed to be the best option for such a tool.

The source of raw data was chosen to be OPS service, provided by EPO. The coverage of OPS is the same as Esp@cenet, which fulfills the needs of the company.

Features and characteristics

In order not to overload this research work with unnecessary technical information, below is provided a list of features, as perceived from the point of view of the final user – managing director of AFM-forest Klaus Grenberg.

Search history and monitoring

The tool allows users to save search keywords in a so-called search mask (or just mask). This way the user does not have to remember the keywords and enter them every time he wants to check the database. This feature allows users to monitor different sets of patent documents without any effort, due to the fact that the software automatically delivers all latest publications according to keywords saved in masks. For example, all competitor names of AFM-forest can be once saved in the mask as keywords for the field "Applicant" and all publications from the competing companies will be automatically delivered to the mask. This solves the major problem expressed by both the company representative and professional patent researcher.

Search logic/limitations

The search is operated by Boolean Operators (AND, OR, NOT) and this way is to Esp@cenet. However, the search engine became morphology aware, meaning that

there was no need to input wildcards (truncation symbols like *,$,?). In other words, the search engine search of the new tool searches not only for the exact match, but also for all word forms of the keyword. For example, a query “system” in the “Abstract” field, will retrieve all available documents containing different word forms like “systematic”, “systems” and others in their Abstracts.

No limitation for the maximum amount of keywords was made. This way users can input as many keywords simultaneously in a mask as they wish. The only limitation in this case is time, which users are willing to spend waiting for result list.

Custom data

The tool allows users to add their own custom data to each retrieved publication. For example, this can be a commentary for each retrieved patent document.

Each retrieved publication can be assigned with a rating. This helps users to work with large sets of publications and sort them by rating.

Export data

All retrieved publication can be exported into .xls or .pdf formats. Publications are retrieved together with the name and description of the corresponding mask and all user commentary. This way it is very handy to create a research reports, containing patent documents and users commentary for each.

Data sharing

All masks can be shared between users of the tool. When the mask is saved it can be shared to other users, meaning that all keywords, retrieved publications and comments for each publication are being shared. This important feature can solve another major need of the company, which is receiving professional help in understanding patent documents. For example, Jouni Hynynen, being professional in searching patent documents, can create a mask, then fill retrieved publications with his own professional commentary and share it to AFM-forest. This way not only will the company receive the mask that continuously delivers relevant publications, but the company also will receive professional commentary explaining what each publication means for its business.

Miscellaneous

- For each retrieved publication there is a link, which allows the user to view the same publication in Esp@cenet. This allows users to quickly jump from the new tool to Esp@cenet and use all additional features of Esp@cenet, which are not available in the tool. For example, “View INPADOC patent family” or “View list of citing documents” or “View INPADOC legal status”.
- Each retrieved publication also has a link to download an original pdf document. This link simply redirects user to corresponding page of Esp@cenet, where he/she can download the original document.
- Fields “Applicant”, “Inventor”, “Title”, “IPC”, “ECLA”, “Publication/Priority date”, “Publication number” and “Rating” can be sorted in ascending and descending orders.

4.5.3 Reflection

The new tool turned out to be simple and powerful at the same time. As can be seen from several screenshots provided in Appendix 5 (see Figures 10-12) the interface was truly simplistic. This clearly was a strong point, and it was expected that the company would appreciate that. In general it seemed at this point that all company needs have been satisfied. It was time to provide company with access to the tool and collect the feedback.

Meanwhile, due to the fact that the tool had coverage of around 60 million publications worldwide, this became evident that it can be and should be used by other companies and professional patent researchers. Given its simplicity and broad coverage, it could become a substitute or at least an add-on to public patent databases like Esp@cenet, Depatisnet and others. Moreover, the tool ended up being more than just a tool for patent search and monitoring. The tool could also be used for IP consulting, in particular for consulting related to patent searching. Using the new tool professional patent researchers could efficiently assist their customers in their patent search. The tool provided all necessary features for sharing search keywords, retrieved publications and professional commentary in one comprehensive package (or so-called “mask”). Therefore, the tool seemed to have viable commercial prospects.

The technical solution behind the software tool has been protected to some extent, by initiating a process of obtaining a US patent. However, it did not mean that a patent protection will be finally achieved for the tool. It is a common practice that software as such is not patentable in Europe. This means that in case the tool reaches the market and is successful, there will be many other software developers willing to mimic the original ideas, described in this research and realized in the developed tool.

4.6 Cycle 4: Feedback from AFM-Forest

4.6.1 Background

After the newly developed tool had undergone some testing and debugging it was delivered to the company. The company was given one month to use the developed tool. In the beginning of that period a short training was provided to the company representative. Experience from the training was quite positive, due to the fact that in less than one hour the representative could understand the main point of the tool and tried to use it himself. Thanks to simplicity of its interface the tool required almost no training at all.

Research questions: Cycle 4

The set of research questions in this cycle was targeted to measure the level of company's satisfaction with the tool. An interview with the company representative - Klaus Grenberg - was chosen as a method.

Section A

What is the company's opinion about provided features?

Section B

What changed in the company after the tool was introduced and was there any advantage that it gained over the competitors?

Section C

What was the real value of the tool to the company in terms of time and money?

Section D

What about the future prospects of the tool? What can be enhanced?

Purpose and expectations

This final action was expected to provide a feedback on how successful the tool was in solving the company's problems. This action was also expected to provide a valuable insight into how to market the tool further to other companies and whether it could be successfully commercialized. Of course, the single company could not be regarded as an appropriate sample for judging how other SMEs would behave, but at least it would provide a real-life example of the tool being used for needs of an SME.

4.6.2 Results of the action

Section A

According to the respondent the tool has all features one may need when searching for patent documents. The most surprising feature for the respondent was the concept of creating masks. Although during the first interview the respondent did express the idea that the company needed some way to automatically retrieve publications, he could not imagine that it would take such a form. The fact that with the tool the company then could have all publications "right in front of us" was one of the most important as expressed by the respondent.

Concerning the speed of the search respondent shared the same opinion as during the first interview. For competitive intelligence purpose it was not important that the speed of the search was high. However, the respondent noticed that the whole process of patent search has become faster than in Esp@cenet.

Another feature that was emphasized was the ability to share masks. In the very beginning the company was shared one demo mask, which monitored all other competing companies in the industry. This way the company representative did not even have to fill any keywords in the search engine, as they were provided inside that mask.

Adding custom commentary for each publication was also pointed out as an important and useful feature. The respondent shred: “When now the company has the system for efficient storage and collection of patent documents, possibility to leave commentary for each becomes crucial”.

Section B

The tool improved significantly the way the company stored patents. Before the tool, patent documents were chaotically stored in printouts or pdf files all around the company, while with the tool they all could be collected in one place. It also became easier for the employees of the company to review the retrieved patent documents. Thanks to the interface, all publication could be seen in one table displaying all major details about each document (title, applicant, inventor etc.).

In general the respondent shared that the tool would give the company advantage over other companies from the industry. He emphasized that it was crucial to know what other companies were developing and searching patent documents was one way to do that. He added that currently it is common that competitors discover about each other’s new inventions only when they reach market shelves.

Section C

According to the respondent, the tool could save the company some 30% of the time, if it would be used to do the same work as before. However, it was emphasized that the real value of the tool was not in the improved efficiency. The tool provided the company with the desired system to manage patent documents. Indeed, the respondent claimed that with this tool, he could actually spend more time on work with patent documents as before, because many new opportunities had arisen. He claimed that with the tool company started to go to the right direction and he personally was willing to spend more time on work with patent documents.

Section D

One suggestion was that the tool might have more features for graphical presentation of the retrieved data, like pie charts etc. However, the company representative shared that he was fully satisfied with the current range of features and could not think of any missing feature.

However, it was also observed that the tool did not solve the whole problem of the company. Even if the tool provided the company with a way to efficiently collect and store relevant patent documents, it still did not solve the problem of understanding what each particular publication meant. The company representative claimed that he did not have enough skills in IPR to understand all the codes and terminology contained in patent documents. His suggestion was to embed some features, which would provide comments about what each code meant.

4.6.3 Reflection

During the final action (see Appendix 2) it was discovered that the tool suits needs of the company and all expectations about its features have been fulfilled. Now the company can efficiently monitor patent documents from different technology fields or competitor groups. Moreover, the tool provided the company with possibility to work with patent documents in a more systematic way. However, the whole problem of the company does not seem to be entirely solved. The fact that the company now can efficiently collect, organize and store patent documents does not necessarily means that it can fully benefit from these documents. The major challenge, as expressed by the company representative, is now to be able to understand what each retrieved publication means. As Mr. Hynynen (2010) explained patent documents are sometimes hard to read and understand. It is true that patent documents contain numerous codes and sophisticated terminology, and it is a challenge to understand them. Another weak point of the tool was related to the data coverage. Even though the tool covers bibliographic data of around 60 million publications worldwide, a lot of information is still missing. For example, when the patent document is found, the company needs to know whether it is valid or not, whether all fees have been properly paid or not and many other additional facts.

One way to solve this problem without making the tool overloaded with additional information can be to encourage different patent attorneys and consultants to use the tool for consulting purposes. For example, if the company has particular questions regarding a publication, one efficient way to get it answered can be asking a patent professional to leave his commentary right inside the tool (using the commentary feature). For example, this professional can be Mr. Hynynen, who has

extensive experience in reading and understanding patent documents. This way the concept of creating and sharing masks inside the tool can significantly enhance the way patent attorneys and consultants assist their customers in patent searching issues.

Using the tool professional patent researchers can find appropriate keywords for a search, save them in a mask, add their professional commentary for each retrieved publication, and then send it altogether to their client. This way, not only does the client receive the desired patents with the professional commentary for each, but he also will be able to monitor the situation in future (due to the fact that the keywords were saved).

On the other hand, there are other ways to make patent documents a bit more understandable without help of professional patent researchers. For example, different codes and numbers contained in patent documents can be efficiently translated by means of software. One example can be automatic translation of kind codes of patent documents. A kind code usually appears at the end of a publication number of each patent document and is written in brackets like EP2285147 **(A2)**. Almost each national patent office has its own table of kind codes and it is almost impossible to remember all of them. For example, while Italian granted patents have (B1) kind code, Japanese ones have (C1 or C2) and so on. There are large kind code concordance tables published, for example, by WIPO, which provide translations of all codes under different code systems (EPODOC, BACON, CAESAR etc.). No doubt that a computer can deal with code translations a lot more efficient than a human.

5 FINAL REFLECTION: Results and lessons learnt

Results

As a result of this research work a software tool for managing patent information has been developed and exclusively tailored to the needs of Finnish SMEs. Despite the fact that the research took place in Finland and was carried out for one single SME, there is no doubt that the tool has potential to be used by SMEs and patent researchers in general all around the EU.

After testing the tool for one month the company representative reported that the tool provided all the features for working with patent documents, which he could have expected. However, due to the lack of skills in reading and understanding patent documents, the company representative still could not fully benefit from patent documents, delivered, processed and stored by the tool. Even with all relevant patent documents right at hand, it was still a challenge for the company representative to understand the meaning of each document. Patent documents contain enormous amount of codes and symbols, all meaning something relevant and important. Moreover, patent documents (especially European) sometimes are written in a very complicated manner with extensive use of specific terminology, which makes it very hard to understand the described inventions and claims. While the first problem can and should be solved by means of the software, the latter problem is quite hard to eliminate. The point is that it is not easy to gain all the necessary skills required for reading and understanding patent documents. Understanding patent documents is the bread of an army of IP attorneys and IP consultants. Indeed, it is hard to imagine a software code, which can substitute years of experience of an IP professional. However, what can be achieved by means of software is a new, more efficient way for SMEs like AFM-forest to consult with different IP professionals, for example professional patent researchers like Mr. Hynynen. This issue will be discussed in detail later in this chapter.

Research process

The chosen methodology (action research) allowed the work to develop independently without having to follow any strict plan or guidance. As it turned out,

this was crucial in approaching the research question. All actions of the research happened in a sequence, so results of one action raised questions for the following actions and so on and so forth until the main research question was fully addressed. Moreover, as it turned out, the whole original research question was reconsidered during the course of this action research.

In spite of the fact that there were only 3 professionals participating in the research, they together seemed to represent a good sample for this study. These were professionals from very different areas, namely patent information research, software development and management of an SME. On one hand, the chosen methodology allowed delving deep into professional experiences of each participant and extracting valuable knowledge on how things are being done or should be done. On the other hand, the chosen methodology allowed analyzing the same issue from three different paradigms, which created crossfire of ideas and stimulated critical thinking. Despite the fact that the interviews and interactions with participants took place one after another, none of the ideas or opinions were given any priority by default. This way all professionals could equally influence the direction of the work. As a result, not only did the case company get its research question answered and the problem solved, but a new, marketable tool was developed. This research also started an innovation process including the protection of corresponding IPR and turning the tool into a marketable product with potential to suit the needs of other SMEs and IP professionals in the EU.

Limitations of the research

One limitation of the work was lack of resources for implementing the software. During the development process a number of free and open source software applications were utilized, which allowed creating powerful features. However, the major limitation came from sourcing the data. Using OPS as a tool for sourcing the data provided satisfactory results, but having all data in-house would have significantly increased the number of possible features and would have increased the overall speed of the tool.

Another limitation of the research process was amount of participating professionals. There is no doubt that five or ten professionals would have provided even more valuable insights.

Another limitation comes from the fact that the participating company was not given enough time to comprehensively asses the tool and its benefits. As was discovered during the last interview with the company representative, the introduction of the developed tool to the company urged to greater attention to patent information and search from company staff. As the respondent expressed, now that they have a systematic approach to work with patent documents, they are willing to spend more time on the issue. Therefore, if the feedback would have been collected in six or twelve months after the introduction of the tool, more useful feedback could have been collected.

Ideas for future research

The methodology, which was used in this research, can be applied in other areas different from software development. Indeed, the action research can serve as a methodology to solve almost any problem, which involves improving someone's professional practice. The method used in this research seems to suit well the research problems, when a practical and tangible result or improvement is required. This type of research also requires significant amount of freedom in terms of what is expected as a result. Action research seems to be the wrong choice for standardized research works like, for example, customer satisfactory surveys.

Narrative reporting seemed to perfectly match the chosen method. It allowed the author to express the events the way they actually happened and share his experience and gained insights.

In the author's opinion, improving someone's practice is somehow similar to telling a story or drawing a painting: one can always continue the process. The iterative structure of an action research combined with a narrative reporting style seems to be exactly what a practitioner needs. The greatest benefit of this approach is that the research can be always continued with more actions and more results.

As for software developers, the action research structure holds special benefits. Naturally, software developers are people with engineering mentality. Being creative by nature, software developers can too easily get lost in the process of development of the software and forget about the actual customer's need. The action research structure can help software developers to switch their focus from the actual software development to other important actions like communication with customers and analysis of their needs. If a software development project is viewed in the lens of an action research, it will look like a continuous cyclical process of two alternating groups of actions: one group responsible for actual development (coding, desing etc.) and the other for collecting and analyzing customer feedback. This can significantly improve customer satisfaction of the developed software product. However, this research work and its method shall not be regarded as an example of an actual software development process. The software was written by professional software development company and the author was provided with the "final software product".

Further development of the topic and the tool

One suggestion for further development of this topic is to attract more professionals from different areas of practice for testing the tool and exchanging opinions. These can be corporate managers, scientists, inventors or IP consultants and attorneys. Yet, significant attention should be paid to preventing the tool from expanding too far from what the real need of SMEs is. Given enough resources and time for development, it would be so easy to get lost in the process by adding more and more useful features and becoming one more Aureka or PatBase. The very first and most important characteristic of the patent management software tool for an SME is simplicity. **Simplicity - is key**.

It seems that one right direction for further development of the tool besides adding features can be creating a society or network of IP professionals, who could help SMEs and other non-professionals discover the world of IP via the tool. For example, in the case of AFM-forest , the company lacks experience and skills in reading and understanding patent documents. Given the small scale of the company and its limited resources, one good solution can be to outsource reading and understanding

patents to an IP consultant. In this case, the developed tool can serve to enhance the process of communication between the company and the consultant. The concept of creating and sharing masks of the search seems to fit this goal perfectly. For example, AFM-forest can create a mask and then share it with the consultant and ask to explain what any of the retrieved publications means. This can be efficiently done even in the current version of the tool by adding professional comments to each publication. Or if the company is trying to make a novelty search for a new R&D project and cannot find the appropriate keywords for search, the consultant can come up with relevant keywords, save them in the mask together with his commentary and share it with the company.

This way the tool can be tailored to the needs of IP consultants and their clients seeking help in patent search. Another place of similar application can be in the numerous business incubators spread around the EU and, in particular, in Finland. Virtually all organizations, where inventions start their way towards becoming innovations, can find the tool useful. It can be especially useful during long term R&D projects, which are usually undertaken by groups of companies. The normal procedure for such development projects is to do the prior art search in the beginning of the project. However, given the current rapid pace of patenting, there is a need for constant monitoring the prior art, not just once in a lifetime search. Therefore, the tool or a future modification of it may be very helpful in organizations like TEKES, JYKES, Jyväskylä Innovation and similar organizations in Finland and the EU. Thanks to its simplicity, the tool can help many young hi-tech companies make their first steps in utilizing and benefiting from IP information.

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APPENDICES

Appendix 1. Transcript of the first interview with Klaus Grenberg

Q: - Question

A: - Answer

Q: Define major activities (internal & external) related to work with patent information in your company

A: First of all, I should mention, that our company uses patent information very seldom for R&D. It is because we do not have tools, it is too complicated and people do not know how to do it. But quite often our marketing staff checks patents for competitive analysis purpose. And of course, they later comment their findings to R&D department. This means, that we do not have a system, when we automatically check patents before our R&D department starts a new project. We do not update our patents. We are not active in this sense.

In this sense I would say that we are quite common Finnish SME, when it comes to working with patent information

Q: Why the company works with patent information (searching)?

A: We recognize two reasons for working with patent information (searching): Competitive intelligence and R&D (novelty search). And I should admit that patent information gives very detailed information about technology, which exists already, and it can be used as a basis for further development. While reading patents you can come up with some good ideas on how to improve already existing technology or maybe just making it little bit different. So, it is a great tool for searching new ideas.

Q: What your company strives to achieve with patent search?

A: First of all, you need to know the technology competitors are using in order to argument your own products. This is a benchmarking.

What concerns R&D, we a striving to get new ideas and also save time.

Q: Do you think your competitors share the same thinking with you about this issue?

A: Large corporations are very familiar with utilizing patent information. They have systems in place, they have competent personnel, responsible for IP matters.

However, small and medium size companies are not very active in this field. In reality the attitude of SMEs towards utilizing IP is extremely passive. At the moment, SMEs are trying to outsource processes linked IP. But it is quite expensive to do that, because patent offices charge high prices, when dealing with companies who ask for complete solutions. For example, if one comes and says: “We are looking for information about this technology or that technology. But we do not know where and how to find it, which keywords to use etc.” It will be very expensive. And it means that SMEs do not use these expensive services.

With SMEs I mean companies with up to 100 employees or 15-20 million in revenues. I guess some 80% of companies in Finland fall into this category.

Q: Describe existing procedures for searching patent information in your company.

A: Mainly, we are using Espacenet. We also use PatInfo, which is published by National Board of patents and registration of Finland. Espacenet gives good results. After we find some interesting publications in Espacenet, we save then on our server or print them out. If some information is not available from a publication, we also can order the full text from a patent office (government patent office, not private).

Q: So, what is the format in which you keep publications of your interest?

A: In . pdf – the one that Espacenet is providing.

Q: So, it is not really researchable, right?

A: Yes. Well, we have to name these publications according to the subject.

Q: You mean by company name?

A: It depends on where the need comes from and how we search. Most of the time we look for company names, inventor names or subject (technology name)

Q: But, what is the reason for storing your publications in such a way?

A: Basically, I am the one who is checking patents at the moment. When we start new R&D project, you probably know how the Finnish guy is inventing something new. He never cares about what others have already invented. And this is when {when new project starts} my turn comes and the first thing I do is searching for what others have already done in the field. I find all competitors, who have similar systems, then I find their patents and print them out. But basically, when I take these printed patents there {R&D department} little by little they return back here on my table. I have no idea who is doing that!

(Showing a large, fat folder full of some paper) For example, here are all interesting patents I could find related to "cutting". So, we have a group of interesting publications here.

(Flipping pages) Here is "saw control" - patents related to controlling the saw.

Q: So, you mean when someone in R&D comes up with some new project related to "cutting", you open this folder and check for prior art?

A: Yes, we can check here. But, of course, this folder is not being updated. So, it lies like I once printed it. Some latest publications I found might be on our server. Unfortunately, there is no system for that.

We also collect some leaflets {non-patent data} from web-pages of inventors. This is also part of our benchmarking. It was made for R&D, but it seems that they do not like it. They always bring it back to my table.

Q: Which resources (for example, online) your company is currently using for search patent information?

A: Espacenet.

Q: Why not USPTO?

A: I do not know. Maybe lack of knowledge. I have been in couple of courses by Mr. Hynynen and our designers, they have also been there. But, we do not use USPTO so often, we are not familiar with this search engine.

Q: Which costs are related to searching patent information in your company?

A: Search time- roughly 500 euro per year in terms of salary. From time to time we need to order publications (pdf or paper copies) from the patent office {the ones do not have full text available in Espacenet} - this is tens of euros, not more. At the moment, this is it.

Q: How many people are involved in working with patent information (in particular searching patent information) in your company? What exactly they do and which positions they hold in your company?

A: I am the one searching. But then users are technical manager, sales manager and two employees from R&D. In total 5 persons.

And we do not work with patent info on daily basis, not even weekly.

Q: And how does your team work?

A: Many times the search starts from the fact that sales people find out that some competitor is having a new system. And then we check it from the marketing point of view. Is it really a new system and to know that we check patents. Only after that, we transfer the information to our R&D.

Q: How often you work with patent information?

A: Naturally, when new R&D project starts or something appears in the market. Approximately 3-4 times a year. Once in two-three months maybe.

Q: Do you think it is a good idea to monitor patents more frequently, like a continuous process?

A: I think it could be reasonable, but I am sure that in this field {forestry machinery industry} we do not get so many new inventions. This is due to quite limited number of companies in the industry. Our competitor list includes approximately 20 companies and most of them do not have even a single patent published. I think this is because they are small companies, extremely small in many cases.

Q: But what if you think about not only competition monitoring, but also a broader concept of technology monitoring? Maybe monitoring “hydraulics”, “pneumatics”? That is something that is always evolving, right?

A: Yes, indeed. But that is something we have not been able to even search for. We cannot even imagine how we can carry out a search for some, let's say, hydraulic system. This is because these systems are extremely complicated. Even if you have a diagram it is very hard to understand. Like for example here *(flipping through pages, showing one patent and a diagram)*, we have been studying this patent and came to conclusion that system like explained here cannot even work! But this is still a patent, and nobody seems to know what is actually patented there!

But so far, we would be happy at least to cover our competitors.

Q: For how long have you been doing patent search in your company?

A: Always. Since 1993. First we needed to ask patent from a patent office, because I think these online services has been around only for last couple of years. But, anyway, it seems that nothing has changed since 93. Of course, now there is his Espacenet service, which is quite user friendly, but I did not spot any major development.

Q: There is one theoretical framework for determining strategic importance of different processes in a company (Core vs. Context). You can see the framework below. Horizontal axis defines how important is one process in a company in terms of winning customers. Vertical axis defines whether failure in a process will create serious and immediate risk to a company.

Question: Where would you put your company's processes related to work with patent information in this graph? Why?

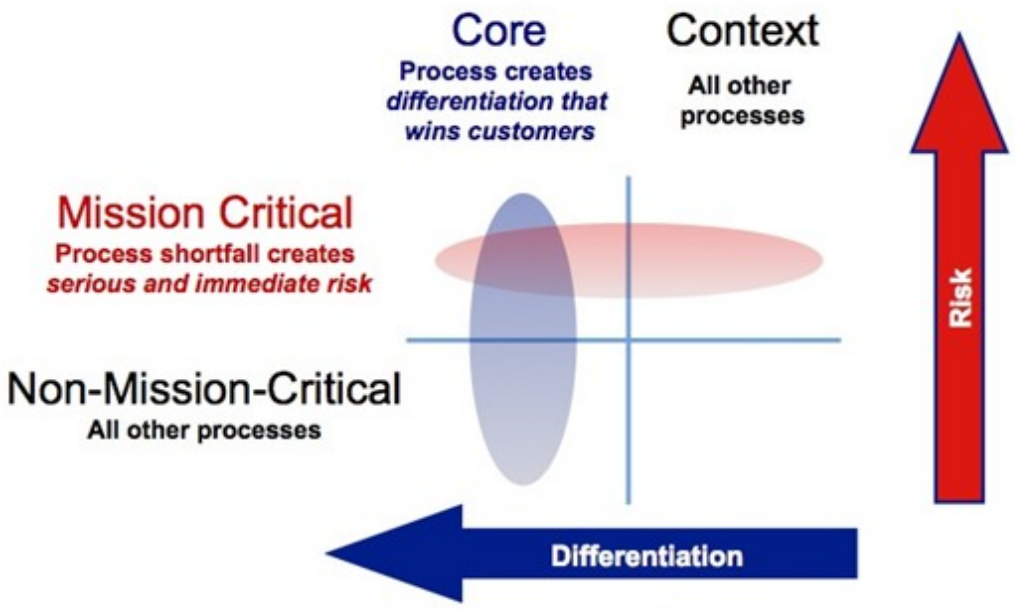


FIGURE 7. Core/Context Analysis Framework. (Moore 2005)

A: If we think about patents {process of following patents} it is mission critical. In case we develop some system that has already been patented, there is a risk of potential problems with patent holder. So, from that point of view it is very critical. But, I think in a company of our size it is somewhere far from being mission critical. It should be recognized as mission critical but it is not. I guess you know what is the situation with IPR in Finland. It is amazing! {Finnish company} can run huge R&D project, which takes years to develop, and without any IPR protection.

What concerns searching patents – it is a core process. Well, not the search itself {it is context}, but results of it are core.

I think these searching tools, they should be as a first step into using patent information. Although these tools do not cover all data, they make it easier {affordable} for our R&D people to make searches. I think this is the biggest benefit from such software tools. Because, now they do not search because it is complicated.

Q: But what is so difficult about it?

A: It is quite difficult if you have never tried it before.

Q: Is it the Espacenet search that is difficult to work with?

A: Well, I think they {R&D guys} just do not know where to go {which web-page}, how to search. For example, if there was an automatic system, which could deliver all publications according to listed words or company names, it would be very useful. Because, now R&D people are not interested, because they cannot search and think that it is not necessary.

Even for me Espacenet is not very handy.

And it does not solve the whole problem. Ok, I can get results, but what it really means? What I am actually interested in right now, is how to read this *(points at the folder)*. I do not mean I do not understand specific terms. I mean I have to know is it {a patent} really valid? And whether the right transfer has been done? Who is the real owner at the moment {of a patent}? When will it expire?

Q: Which operations (search, organization, storage, analysis, litigation assistance) do you think can be done most efficiently by piece of software for your company? Why?

A: I think only this stupid job of searching can be done efficient with the software. Because now it{patent search in Espacenet} is done manually.

Q: Yes, in Espacenet you have to search patents manually every time. You cannot accumulate you results, knowledge.

A: Many times I need to find the same patent, because I did not save it. So I try to remember, where I found it. It is not always easy to find patents.

Q: And how you determine who is the holder of the patent?

A: You can find this information in Espacenet. It is called “status” or something like that

I have been going through those {techniques of search} with Mr. Hynynen many times, but …. There are not enough instructions there {Espacenet} on how to read the patents. That would be for me really useful information. What does this or that number means, what can I see from a patent number?

Q: Have you ever attended any IPR courses?

A: No, there are very few of them. Basically, Jouni Hynynen is the only one who organizes them. They are 1-2 days courses. These are good courses and I find them informative. However, you just forget things, when you search only 2-3 times a year.

Q: SCORE

Simplicity (easy-to-use, no extensive training needed)

This is number one! The most important.

+Some kind of instructions how to read patents, would not be bad. And maybe some additional service (like a phone call) in case you cannot read/understand particular publication.

Speed (lead time in operations)

Also not very important. Does not matter if it{one search} takes 5 minutes or 1 minute.

Analytical and statistical resources

I do not know whether we need it or not. We are taking first steps. Other companies of our size as well. We cannot start with complicated tools from the very beginning {e.g. technology maps}

Flexibility (adaptive to different needs and situations)

I think for our needs I do not think that there is going to be a problem with flexibility. Our target is just to search for patents

Price

Comprehensiveness and reliability of data

Reliability is important. But the bigger problem is how we read the patent. I think that the system can be more reliable than our ability to spot that.

Design

Not so important. It is a tool.

Q: If your company got the soft you described in 14 and 15, which advantages would your company get compared to your competition? For example, reduced costs. Where? Better decision making. How?

A: We are looking for cost savings in R&D by knowing the existing technology and taking advantage of developing it further. No idea about savings, maybe we can avoid losses in development work, reduce spending on prototyping and testing.

Another positive thing is that when you search patents yourself, it contributes a lot more to your knowledge of the matter, then if you just ask someone {like a patent office} to provide you patents for the matter. You can accidently find some interesting publications, which you never expected to find. It would be great if we could make our R&D people search patents.

{When searching patents you have to be open-minded, which is impossible when you are outsourcing patent search to a patent office. When you ask a patent office to make a search, you should clearly define the task and wait for result}

If we talk about technology search, the moment when you are searching is interactive. You get results for each keywords and this is the way you find proper keywords.

Q: Do you use Google patents?

A: Yes, it is fast and it gives quite good results. Of course the database is not complete, but it is faster than Espacenet. I do not know the source of data there, but there are patents there.

Appendix 2. Transcript of the second interview with Klaus Grenberg

Q: - Question

A: - Answer

Section A

Q: Concerning the features, have you got what you expected? Were there any surprises for you?

A: There seems to be everything in the tool one may need when trying to find patents. And his mask concept, we could not even have thought about it. So, it was a surprising feature. We were looking for some system to automatically deliver patents, but we could not imagine that it could look like that. It was surprisingly good news for us, when we could see the system bringing all the patents right in from of us. I mean not only patent numbers or name of inventor or some other single field, but it really shows you the whole bibliographic info.

Q: What do you think about the speed of the search?

A: It is fast. I think it is even better from this point of view than Esp@cenet. Maybe the speed of the search is not faster, but the whole process takes now less time. Esp@cenet web-pages have a lot of information, and it takes time to find what you need.

Previously, you told me that you did not care whether one search took you 1 or 5 minutes. Now the speed of the search in the tool is a lot faster (seconds). It is better than anyway, but do you really care about it?

Not really. We are in such a business where you can put all the available patents in one paper folder. So, we do not have much to search. But when we talk about other kind of search {technology search} this is completely different story. But so far we have limited our patent research only to competitor analysis.

Q: Which were the features you found most useful?

A: This mask idea was really useful. Also the automatic updating feature of masks seems very useful.

These masks were especially useful, because it was you who made it for us {I made and share a mask monitoring patent documents of AFM's competitors}. But anyway, it is very handy to work with masks on weekly, daily basis.

Q: What do you think about comments?

A: Well, in our situation we had no system for working with patents. Some of them are printed out and stored in paper folders; some are saved on our company server. But if we have a system than comments would be a great feature to have.

Q: Can this tool become such a system?

A: It should be.

Section B

Q: How did the tool affect your company's operations?

A: The tool improves the way we store patents. It provides good accessibility to patent documents of our interest.

Esp@cenet does not really provide this feature. Because in Esp@cenet there is always a need to remember search keywords. Even if our keywords are mostly company names {hard to make mistake spelling competitors' names} we encounter problems. For example in some cases patent documents of our competitors do not have their names as applicants, due to the fact that they purchase patents from other applicants and inventors.

Q: Has anything changed in the way you do novelty search or competitive surveillance?

A: Now we can see our patents in the tool in an efficient manner. We now see the lists of documents with all major fields like numbers priority dates etc. in one page. This is very handy. Also in this case commentary can be very useful.

It seems patents are like a myth {around companies}. If you do not know anything about patents, it is very difficult to enter (for example start to search). Because when

we did not have internet years ago, working with patent information was an awful thing. The only way to search patents was to contact a patent office or go straight to the patent registration centers and order patents or pay for a patent search. An then you were in this critical position, when you had to tell what you need to search. And of course, you did not know exactly, because you could not try different keywords. Actually, terminology in patents is very different from normal language. Sometimes it is very hard to find proper keywords.

Q: Do you think the use of this tool would provide your company an advantage over your competitors? Please explain how and why?

A: It is important to know what your competitors are doing. And patent search is a one way, official way to learn what your competitors are doing. Many times information comes too late. Sometimes it happens that something new is already in the market and our customers tell us about that. And only then we start to search for some information about this new product.

Q: What about other employees in the company? What was their reaction to this new procedure? If there was some reluctance in adoption, what do you think was the reason for that?

A: We have not tried it yet with other employees. But I hope they are going to adopt it well. But we have to see that. Because, for example, when we have R&D meetings and I keep showing leaflets and brochures of our competitors, but most of the time R&D people are not interested in what others are doing.

Section C

Q: You said during our first interview that the company spends approximately 500 euro per year on patent search in terms of time and salary. If you got this tool for free, how much do you think the company would spend next year doing exactly the same work?

A: The biggest benefit of this soft comes from the fact that you can efficiently store documents. In addition it is updated automatically. I would say 30% of time can be saved while using this tool. But it gives a bigger advantage than just time savings.

Q: What do you think is the real value of the tool for your company? For example, if you get the tool for free, do you think the real value of the tool for your company will be 500 euro minus whatever it saves you in terms of time?

A: Well, we did not fully utilize the patent information before. With this tool we can now actually do more work with patent documents. We can monitor documents more efficiently.

Q: But this calls for more time anв efforts from the company, right?

A: Yes, but this is the right direction. We should spend more time on work with patents. And we are ready to spend more time on doing more searches now, because now we can save the results of each search and benefit from it later. That was impossible to do before with tools we used to use.

Section D

Q: What do you think about future prospects of this tool? Which features should be in V2.0?

A: Ok, for me, I would like to see a program which gives me a comment about each publication

Q: But you can have it in this tool! Just convince Mr. Hynynen to do that for you and send you comments for your publications inside the soft.

A: But anyway, at this point I cannot think of any other feature, which I would like to have in the soft. This one pretty much does everything we need. Well, maybe some features for analysis of data, like pie charts.

At this point, for me is the next challenge to understand what each retrieved publication means. I think something can be done by the software to help to understand documents. They all have many numbers and codes, which are hard to understand. Software can solve this, for example, by providing explanations for all codes and numbers. Another issue is how to find out whether a document is valid or not. Because sometimes applicants do not pay all fees, which affect the validity of documents.

In general, I think this tool is a good way to enter a patent world.

Appendix 3. Transcript of the interview with Jouni Hynynen

Q: - Question

A: - Answer

Q: What is the most time consuming operation in your work?

1. Patent search
2. Patent storage and organization
3. Patent analysis
4. Application filing
5. Other

A: Most of all I do patent search. This is some kind of general patent search – or novelty search. We do not store patent information. In a small amount we teach our clients to understand patents. But still the most important part of our job here is to search for novelty of inventions. This is called prior art search. 50% of our clients are private inventors and 50% are companies. For inventors we do this prior art search, but companies are usually also interested in what is inside some patents, and we try to analyze it.

Q: Give a score (from 1 to 5) to the next statement, according to how much you agree with it. Explain why you gave such a score.

Finnish SMEs nowadays have a good understanding of how they can benefit from available IP information, like patents.

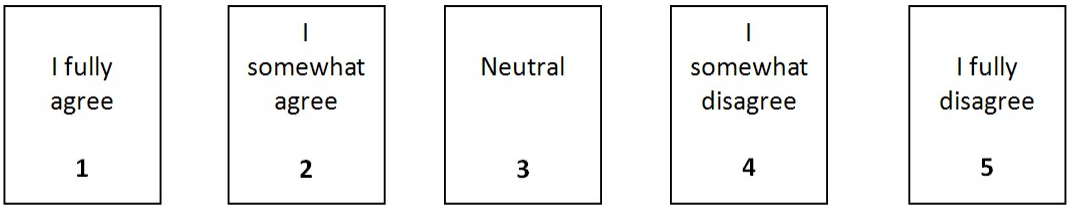


FIGURE 8. Likert scale checkbox.

A: I fully disagree. They {SMEs} really do not know

Q: Why is that?

A: We tried to understand why. First of all, these companies are so small. And the obstacle is that they do not have time. Because managing director{of such a company} has so much to do, so just does not want to burden himself with new ability, which will enhance his business. And when they do product development, in many cases they are subcontractors. Even if it is their own product they are using their partners to bring the product to market, so they are not really competing much. So, many companies are doing machines, which go into another company. Therefore, importance of patents is not so big there, because, when you make normal consumer products the level of competition is so high, that you need to protect your products in many ways, but Finnish {subcontracting SMEs}companies are not much competing between each other.

Q: So you mean IPR issues are not really important for such companies{subcontracting SMEs}?

A: Yes, it is not very important for them. These are majorly B2B companies, selling products, machinery.

Q: What about companies selling software products?

A: Finnish companies are so small that they do not have enough money for patenting their inventions. So, their strategic focus is not on protecting their rights by patents, because it means that you need to reserve money for lawyers. And they do not have that money and they pretty much rely on copyrights. When they find out about the costs of owning a patent, they immediately lose their interest in it.

Q: Do you think that the situation is improving? How fast?

A: It had been very stable until 3-4 years ago. And then it started to change. One reason is that our network(innovation managers, like me) we have been teaching the importance of IP in schools, universities quite a lot. And now these students went into companies. And now many people know about Espacenet and they have used it once or twice and when they ask us questions the questions are not the same as they used to be let's say 5 years ago (What is a patent?). Now they ask questions like

“what does this publication mean? I have found it in Espacenet”. So , the situation is improving. However, skills are of very poor level still.

Q: Amongst your clients, Finnish SMEs, how new is the idea of using patent information as a source for competitive intelligence (or simply keeping an eye on competitor’s publications and monitoring recent trends in technology development)?

A: It is very new idea It has been rising last 3 years period. I found that young engineers, who for example had attended my courses in the university or college, who had already gone to these companies, they made a lot of promoting work of IP in these companies. And when the company is big enough (about 10 employees) they have these specific roles: one is managing director and one is product manager or R&D manager, then you can focus on patent search (technology search or competitor surveillance). When these young engineers come to such small companies they promote use of patent information. And then they adв this to their toolbox and start asking for more information on how to manage this{work with patent information}.

I think the situation is the same all over the Europe. That was what I heard. And that is what my experience in international projects shows. And that is what they say in Canada too.

Q: How do you and your clients search for patent information? Describe the process of patent search.

A: I go to Espacenet first, because I do not want to reveal these keywords in Google Search. Because the words you put together forms a new invention. And you do not want to give this information to the world through Google. When I find that these keywords are used in combination in other publications in Espacenet, I can try to search them in Google. Therefore, there is no invention in using these words together in Google. Often I go to Google and make a picture search. And then I can find easily products, that are very similar to the invention or a product that solves a similar problem. Then I compare patent information to products that are in the market. That is how I find easily a marketing level (what kind of products are in the market). And when I have invention proposal from my client, then I find the novelty level from Espacenet, I have a good view of technology. From Espacenet I can see

what is coming, and from Google I can see what is now in the market. If the invention is new, then perhaps we apply a patent for it.

But what is important to see is that we do not make study of what we should look at in the Espacenet. We are not translating the words we just go quickly through Espacenet. But we should put more emphasis on translating the words into kinds of languages.

Q: How often one client needs to make a patent search? Is there a need for continuous monitoring of patent information? Why? Do you clients realize that?

A: Well, private inventors they do not like this monitoring. Because the invention process from inventor's view because they are afraid that someone else has already invented this. So they just blindly go forward.

Q: But what about companies?

A: What I have found there happens something in a company and they then do novelty search once again. Well, for example they have a new R&D project and they do the novelty search with my assistance. Then they forget it in many cases, they apply for a patent and they do some R&D project and of something happens in this process, for example other company claims it has a patent for that. Then they come back to me and ask how to make novelty search once again. And I reply: "That is what we made 2 years ago. Why didn't you start monitoring then?" The answer is usually:"Well we did not know etc.". So they do not really do the monitoring. If the company is bigger, they might buy this service from patent agencies. If in the company there are young engineers (the ones who know how to search in Espacenet) they do monitoring in kind of trial and error method.

Q: You mean constantly, manually?

A: Yes, Constantly and manually.

Now I see that small technology companies are trying to use their resources effectively by monitoring their competitors. They know names of their competitors, so they fill them in the search field. And they manually do the search. And they do not have the search history. I call the company and make a consultation and they do

not even have a search history, but they should. And the only thing we can work with is what is left in their minds.

Q: Which are most popular tools for patent search in Finland amongst your clients? Why? Describe their pros and cons

A: Espacenet. It is quite easy to use. It is quite easy to understand and it is working well. I mean there are not many bugs there (anymore). It is official web-site. People trust it.

What we do as innovation managers is very rare in the world. We are like promoters of Espacenet in Finland. In other countries of Europe they are not doing much about it.

Clients also use Google search engine.

One of the cons of Espacenet is impossibility to save search history. Of course, they have this “my patent list” service, but it is not enough. I can’t simply use it, because when a next customer comes I do not want him to see patents from my previous searches. And of course even if I have the results saved, I still might not remember the keywords.

Q: Which are other common problems you or your clients encounter when doing patent information search?

A: Making reports. For example, I make a novelty search on the basis of an e-mail. But after I find something, how am I supposed to print them? How can I report my results? And for example if I do the search tomorrow again, how can I add to this list or results? If you just copy and paste to MSWord it is not going to work out well.

Q: How long can one patent search take in time? What is the reason behind that?

A: In a very simple situation when inventor is proposing something that is in my understanding and experience and it is not a new invention, I can find it in less than 2 minutes. But if it is something that is a new technology field for me and I don’t know the technical terms and neither does the customer, then it takes more time. First trial and error method it gives some results and then you can find the real search terms. Then you sort your search terms. It takes something like 30 mins. If I don’t succeed in

30 minutes I often ask my colleagues or use other methods like Google search. I use dictionaries to translate keywords.

Q: Which characteristics good patent search has as opposed to bad patent search?

A: I have said many times that if you find nothing, it does not mean that your invention is new. It means that you just cannot find right keywords.

You probably do not know what is the technical word. Perhaps, we know the product name, like bicycle has two wheels, pedals, we know these words, but maybe we do not know technical words as “rotating”. And you are not going to find these technical words in a dictionary.

When situation is very difficult, I make a Google search, something about a similar technology, perhaps a thesis or technical manual for a product and then I read it and find these technical words very deep inside some technical manual. It takes a lot of time. Sometimes it can take up to two hours.

Q: Can results of one patent search be used in future and how?

A: We do not really reuse results of patent searches at the moment. We just do not have tools for that. It would be useful if we could do that. Currently there is no knowledge accumulation in the process of my work. I make the same search, perhaps now and maybe next year I do the very same search again. Just the same. I remember that last year a guy came here and talked about one invention and we made the novelty search. Then I gave him result list. But now another guy comes and presents the same invention and I have to make the very same search once again. But I do not remember the keywords, so I have to do translating again. It happens often. You do the same job over and over again. And all of my colleagues are doing the same work too. And we do not have any accumulation of knowledge of technical keywords.

Q: Have you or your clients ever tried to organize found patent information, for example, in form of a private/inter-corporate patent information database? Why yes or why not?

A: Some of my clients have tried. I have suggested them to do that. But I have not seen any success in that. I haven't even seen what they finally came up with. Usually clients just print and put it in a folder.

Q: Probably, you have heard about/used many different software solutions for enhancing work with patent information. What can you say about those? Are they solving your problems and problems of Finnish SMEs? Why?

A: For example there is this Innography. In general I can tell that these software solutions, which I have seen, are complex. And even I, being an expert in patent search and innovation, feel that they{software developers} are starting from too deep. They are not really leading you in your innovation process. They go too deeply into the real patent search, too deep into technology from the very beginning.

Q: So, you mean that it is important for you to get an overall picture, right? And not to get too deep into details

A: Yes. And only rarely we actually need so many details {as these software solutions provide}.

Q: Naturally, the question arises, why would you buy a software like Innography?

A: Well, bigger companies need to store information for their internal purposes. And I think these programmes are for some kind of storage needs.

Q: But I also saw many other software solutions like these from Lexis Nexis, and they position themselves as tools for search and analysis. They call it data mining.

A: Well, that might be also useful when you start a new R&D projects. But what I meant with this storage function was a bit different. I meant that, of course, patent documents are stored on EPO servers, and maybe there is no need to store them on your own server. But what you want to do, being a large company, is to collect all available information about a particular technology and patent information is only a part of it. We just need to put all these different parts of information in one place.

Q: What about prices for these software solutions?

A: These software solutions are designed for large companies, who can afford it. Large companies usually have some budget set for ICT. SMEs generally cannot afford such software tools. Even if they can afford, then they also have to hire a professional in order to work with the tool.

Q: Ok, but this is not enough to find and get all necessary patents in hand, is it? What about reading and understanding a patent?

> For example if we talk about patent applications. In European Patent Convention in article 83 it says:
>
> *The European patent application shall disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.*

What about this principle in reality? Is it easy to understand information from patent documentation?

A: In US it is not the same. They have this “layman”{principle}, which means that everyone should be able to understand the invention. And it make documents very long in US. But in Europe explanations of a patent are quite short, which I like. It is patent agents who are writing applications and fulfilling these obligations.

Q: Are there any attempts to make applications ambiguous? Making your application as ambiguous as possible, just to make sure no one really understands what is written there can be a good idea, right?

A: From the point of view of novelty search this is not a problem. We do not really try to understand patents, in my profession.

But my clients often ask, for example, about what particular patent claims means and what is really protected by a particular patent. Often I see {a lot of} complexity in formulating claims, and I see quickly that some patent claims are formulated just to make you not understand it. I myself can’t understand it, and you need to go to professional agent, who translates it for you.

Appendix 4. Description of the system and method for patent information processing

Adopted from provisional patent application. ATTY. DOCK. NO. 160006-001 US PRO

DETAILED DESCRIPTION OF THE INVENTION

[0004] The present invention includes recognition that while computer patent database powered by a search engine gives a researcher a fast way of accessing vast amount of patent information, this alone is not providing a complete solution to problems of patent information search. Moreover, this invention includes recognition that during the information search from a patent information database, regardless of the purpose of the search, the core process is to formulate a proper mask of the search, rather than to retrieve and download some particular piece of information.

[0005] The present invention is intended to solve abovementioned problems by providing a system and software for creation, revision, storage, sharing of masks of search for one or more patent information databases as well as for creation of researcher's own database, which is filled with use of and according to abovementioned masks of the search. As a result, every time a researcher starts a new patent information search he creates a mask of the search, where he specifies which patent information database/s will be searched and for which keyword/s in which field/s. Then the mask of the search can be saved and can be executed at any point in time, providing retrieved data, which can be saved to researcher's own database. Therefore, this system eliminates the need for manual repetitive work of entering the same mask of the search into different patent information databases over and over again across time and enables researcher to obtain an up-to-date, comprehensive, combined chunk of information from different sources.

[0006] FIG. 1 is a block diagram depicting the system, according to an embodiment of the present invention;

[0007] FIG. 2 is a flowchart depicting processes performed by an exemplary patent information searching program.

[0008] In order to make it possible for many researchers to access many different patent information databases in a unified way, one solution may be to connect all databases and users through one master server as expressed in FIG. 1.

[0009] Generally, the system provides for requesting and streaming information from plurality of databases, like for example 129 and 130, to the user 100.

[0010] User 100 is connected via communication network 125 with the master server 105, which for example can run software like in FIG. 2. The master server 105 is connected to the master database 107. The master server 105 is connected over communication network 124 to server 110 or plurality of servers, which operate plurality of source databases 130,129.

[0011] Via means of exemplary software from FIG. 2, which runs on the master server 105, user 100 can create a query string 121, which is saved in the master database 107. Then from query string 121 the master server composes multiple other query strings, for example 122 or 123, which are sent to one or many servers 110. The server 110 returns patent data 116 and/or 117 from source databases 130 and 129 to the master server 105, which combines them into one package 115 and saves it to the master database 107 and/or forwards it to the user 100.

[0012] This way, all researchers are connected to a master server, which is at the same time connected to source databases via other servers and to the master database. The master database is being filled with data from connected source patent databases through the master server and according to query masks outlined by users. Therefore, this method allows users to access, retrieve and store data from different patent databases in unified format.

[0013] In order to make abovementioned transactions of data possible, the master server can run software, which executes processes like expressed in FIG.2

[0014] Processes, which this software operates with, could be divided into 3 groups:

[0015] Ones that maintain user's interface.

[0016] Ones that make parser work.

[0017] Ones that operate periodically in order to update current patent information database from outer sources in accordance with all user's query masks (vocabularies). These are so-called scheduled processes.

[0018] Processes maintaining user's interface can be broken into Block I and Block II. Block I can include processes for creation of vocabularies. And Block II can include other processes like, for example, viewing, searching and editing retrieved data and vocabularies.

[0019] The process starts when user creates a query mask in user interface (Block I). Query mask (or so-called "vocabulary") can include numerous keywords for different search fields, for example "name of the inventor" or "publication number", as well as information about chosen patent databases (for example patent database from USPTO or EPO). After the vocabulary is formed by means of user interface module the parser module sends multiple requests (for example, http-requests) by means of, for example, CURL technology to chosen patent databases and parses retrieved data to get rid of unnecessary data and get parsing results, which can be some sort of patent information. After parsing results are collected they are filtered in order to sort out repeating pieces of information. Then this information is sent to the users interface module for a check and review by the researcher. If this information is not suitable, the researcher goes back to the first step and changes the vocabulary, which changes results accordingly. When suitable results are found, researcher can proceed to the next step and save vocabulary, as well as results, to the local database. On the final step researcher can also export results as a file, for example in pdf-format or any other suitable format.

[0020] After the vocabulary and result information are saved to the local database, the researcher can continue viewing, searching, editing results in user interface (Block II).

[0021] After vocabularies are saved in the local database, scheduled parsing scripts can use them for updates and download new patent information, having compared it to already existing information. This can be done, for example, using CRON technology. CRON can initiate parsing script for a saved vocabulary and then can check if there are any changes in results for this particular vocabulary. If there are any changes (for example, new information) the module will add those to the

local database. In this way, researcher will be able to monitor new changes in chosen patent databases without manual repetitive work of retyping.

[0022] As long as all vocabularies of all users of the system are stored in one place (local database) and operated by the same system, there is a possibility for all users to exchange and share their vocabularies between each other.

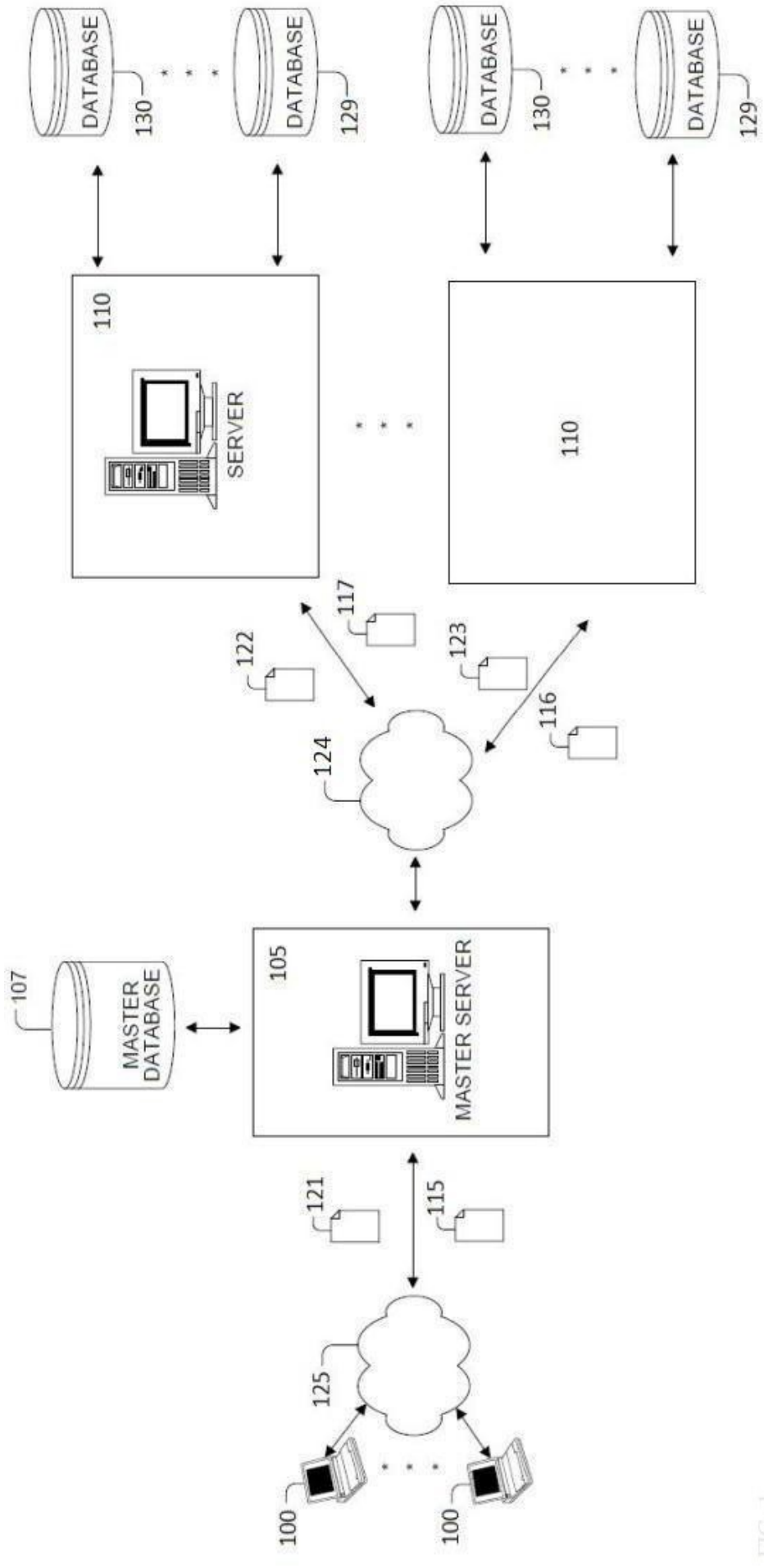


FIGURE 1. The system, according to an embodiment of the present invention

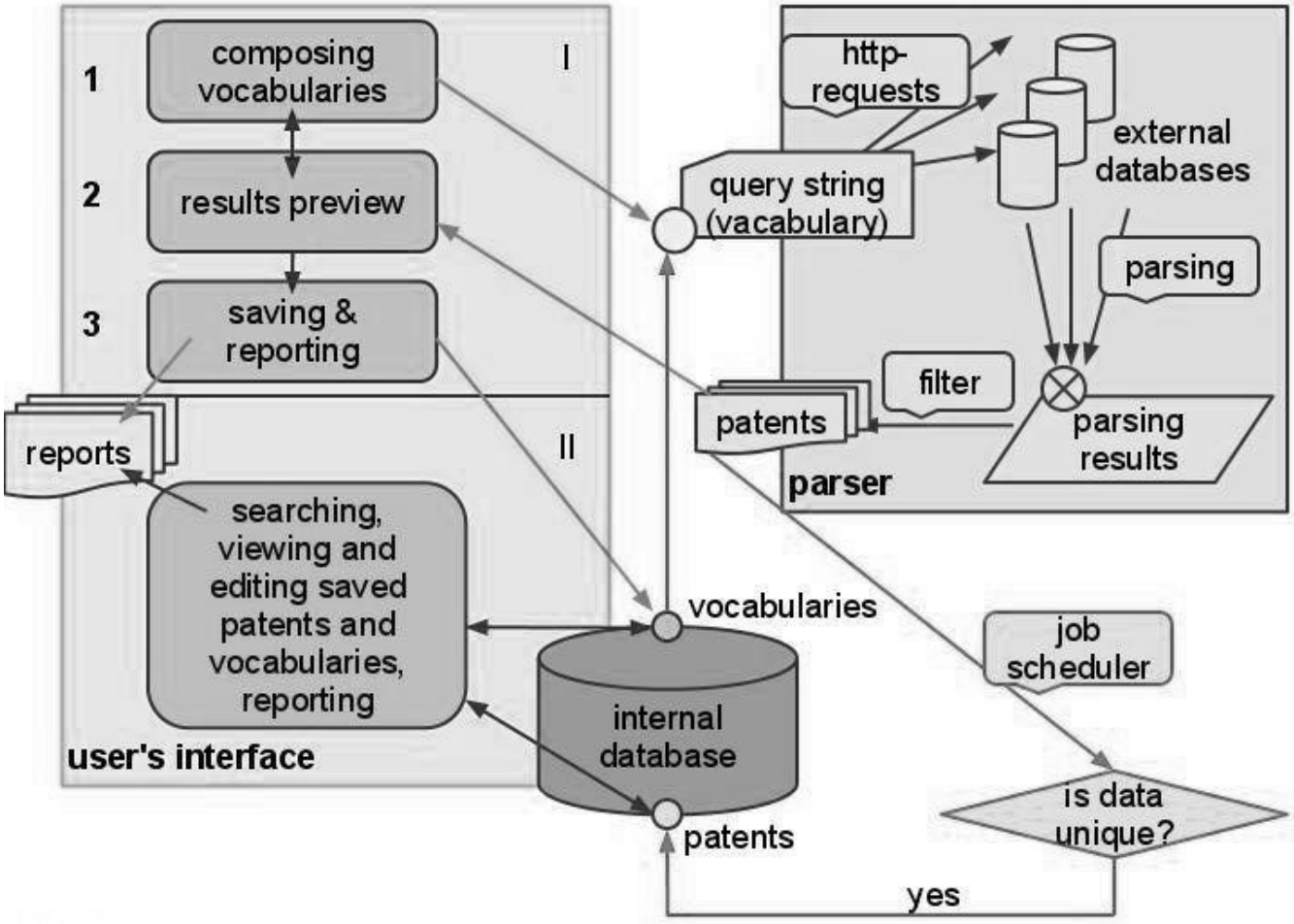


FIGURE 2. processes performed by an exemplary patent information searching program

Appendix 5. The user interface of the tool

Table of search masks

Masks | Add mask | Sign out

Name	Last check	Patent count	Query	Description
Bicycle	30.09.2010 14:08	10000 **(5 new)**	Title: bicycle	I love to ride my bicycle!!!
Demo mask	30.09.2010 14:06	5434	Database: EP; Abstract: NOT nano; Applicant: Siemens or "Nokia corporation"; Date: from 20080101	All European level(EP) publications of Siemens and Nokia Corporation s
Sauna	30.09.2010 14:10	359	Database: FI; IPC: A61H33/06	Search by IPC code
Siemens' publications, s	29.09.2010 21:26	7593 **(46 new)**	Applicant: Siemens; Date: from 2010	
Nokia publications, sinc	29.09.2010 21:26	8392 **(13 new)**	Applicant: Nokia; Date: from 2008	

FIGURE 9. User interface. Table of saved masks.

This is the first table, which user sees when he logs in. Here the user can see information about masks, which he has already created. Also, here you can see how many publications each search mask has retrieved, and whether there are some new publications, which were automatically downloaded from the source database.

Description of major objects on the page

TABLE 6. Table of search masks. Description of the key elements of the user interface.

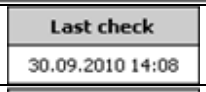
	In this column you can see names of all search masks, which you have created before.
	This column shows you, when the latest update was done
	Here you can see how many publications were retrieved from the source database for each created mask. In brackets you can see how many new publications were retrieved. The tool checks the source database every day and downloads automatically new publication.
	Here you see your final query for each mask
	This column shows you description of each mask. Here you can write your comments or remarks.

Table of publications for each search mask and entered keywords

FIGURE 10. User interface. Mask preview window.

Description of major objects on the page

In this page, the user can see all entered keywords as well as publications, which were correspondingly retrieved from the source database.

TABLE 7. Search mask and table of publications. Description of the key elements of the user interface.

Mask name: Siemens Nokia Motorolla	In this field you can create a name for the mask
Description: WIPO Publications since 2009	In this field you can write your commentary or description to the mask
Database: WIPO	Using this drop-down menu you can sort out publications by their origin of publication. Use standard EPO abbreviations for countries. For example, “FI” stands for Finnish publications. “EP” stands from European level publications. “WIPO” stands for publications of worldwide level.
Publication date: from 2009	You can search publications by their date of issuance.
Test	Use “Test” button in order to review preliminary results before you save your mask
Delete	Use “Delete” button to delete the mask
Showing 1-50 of 134 Page 1 of 3 Go Next »	Use this tool to navigate through result pages
Mark as unread Mark ALL as read Delete Mark as read	When the mask is saved, you can start working with each publication. Put a tick ☑ in a box in order to select one or more publications.

Pop-up window with basic information about each publication

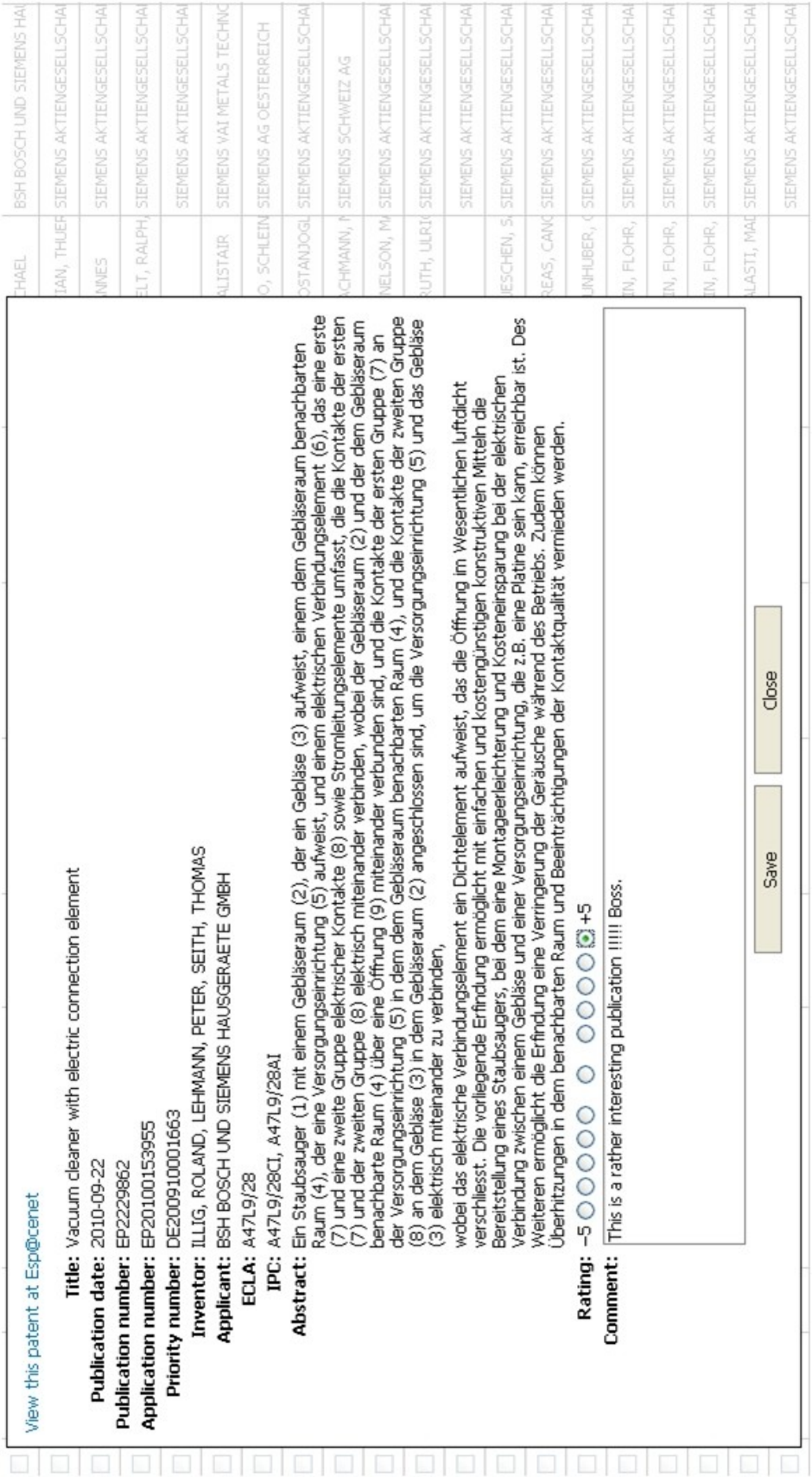


FIGURE 11. User Interface. Publication preview window

Description of major objects on the page:

TABLE 8. Publication preview pop-up window. Description of the key elements of the user interface.

View this patent at Esp@cenet	This is a direct link to the publication at EPO's free web-service Espacenet. At Espacenet you can find more information about legal status, INPADOC family and other sorts of relevant information about the publication.
Rating: –5 ○○○○○ ○ ○○○○◉ +5	You can rate the publication from -5 to +5. This will help you to sort publications within a single mask.
Comment: This is a rather interesting publication !!!!! Bc	In this window you can leave your comment for the publication.
Save	Press the "Save" button, when you are finished with editing your comment and rating.
Close	Push "Close" in order to close the window and go back to the table of publications.